INFANTRY

The Professional Magazine for Infantry

THE FAR NORTH

November - December 1961

TRICKS OF THE TRADE

Packaged Radios

Sgt John R. Hardison Jr, Inf

Infantry rifle companies have been plagued ever since the "Walkie-Talkie" was introduced, by that aggravating, but valuable, piece of equipment which was seemingly designed for use in the defense.

Today's small unit Infantry leader, when complete with field gear, resembles a two-legged version of the pack mule. Not only does he sound and feel like a beast of burden, but the oaths uttered at times sound like the old mule skinner in pentomic dress.

Granted, the PRC-6 has a sling to facilitate carrying, but it must share the shoulder with the harness, and a 9-pound rifle. If the wearer wants to shift the weight, he must exchange the two items, and he still hasn't accomplished a great deal.

In Berlin's 6th US Infantry, where riot control and city combat are greatly emphasized, the radio is very important. It is also even more of a problem, because freedom of the arms is imperative.

The radio itself suffers from the constant banging on objects and rough care. Operating life is cut down, and a PRC-6 in the repair shop is of no value to a leader and his men. This small item of equipment has received more derogatory discussion than any other (with the exception, perhaps, of the entrenching tool). Until the helmet radios are issued, something has to be done.

Note the opening giving access to the plug, volume control, and air valve. The pouch rests in the middle of the back, riding high enough to clear gear carried on the belt.

In the NCO room of 2d Platoon, Company C, 3d Battle Group, 6th Infantry, in Berlin, a solution was found, tried and proven. Unserviceable combat packs were obtained from the property disposal office, cut down, and re-sewed to specifications by the company tailor.

A shown in the photograph, the straps from the pouch fit through the buckles on the harness in the same manner as the combat pack. The cover for the top opening in the pouch has a reinforced square hole for the antenna, and the pouch body has a round hole in it for attachment of the handset to the plug. The lower portion of the pouch has the D rings from the pack, and the harness straps are fastened in the same manner as the pack.

With the radio in the pouch and the handset clipped to the front of the harness, the pouch makes a neat package. The Infantry leader is ready to move with his hands free, and his green tabs and pride unruffled.

When using the AN/PRC-10 radio in a vehicle without a mount, it makes for difficult handling. We here at Bravo Company have come up with a type solution I would like to pass on. Take two ammunition cans, the type that have a snap-open top, and are used for cal .30 ammunition. Remove both lids, cut the bottom from one, and weld them together. The can can be either bolted or strapped to the vehicle, and the radio will slip in and out. The carrying harness can be left on to keep the radio from rattling around. (Contributed by Lt Vernon R White, Co B, 2/12 BG, Ft Riley, Kan.)

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On the Cover: PFC *James Lyapana* and SFC *David Soolook*, 1st Scout Bn, Alaska National Guard.

INFANTRY

Vol. 51 November-December 1961 No. 6

Articles

The Far North 2
Rifle Squad Leader ... ... *S/Sgt Fred H. Bost* 4
Effects of Northern Regions on Military Operations 8
Mobility in Northern Latitudes ... *Capt Henry E. Vincent* 10
30¢ A Pound ... ... *Capt Warren T. Prescott* 13
Arctic Navigation ... ... *Capt Richard J. Kattar* 15
Heavy Mortars in Northern Operations ... ... *Capt Charles W. Strang Jr.* 16
Illumination with the 4.2 ... *Capt William C. Torbett III* 18
The Swedish Infantry ... ... *Gunnar Ruud* 20
SCRAGMAG ... ... *Maj Donald N. Gower* 23
Ice Mining — Army Style ... *Capt Frederick C. DeLisle* 26
The Infantry Board 28
Subarctic Bivouac ... ... *Capt Robert E. Wharrie* 30
Survival Kit ... ... *M/Sgt Townsend H. McCaskey* 33
Reorganization of the Infantry — Part III 34
Defense of a River Line (ROAD) ... *Maj William A. Brown* 40
Soviet Winter Operations 43
Feeding Plan for Subzero Weather ... *Capt Albert J. Smith* 45
Radar for the ROAD Battalion ... *Maj William A. Brown* 46
Cold Weather Injuries ... ... *Lt Col George T. Britton* 50
Fallout Prediction Drone ... ...*Maj Joseph J. Ondishko Jr.* 52
Antitank Drone ... ... *Capt Henry J. Stein Jr.* 53
Leaders Reaction Course ... ... *Capt John J. Morrissey* 54
Clandestine Assembly ... ... *Capt Wayne J. Prokup* 57
Unit Supply System 59
Attack on Skis ... ... *Capt Edward P. Smith* 62
Nuclear Accountant ... ... *Capt Desmond D. Dewey* 64
Maintenance in the Far North 66

Features

Tricks of the Trade Packaged Radios *Sgt John R. Hardison Jr.* Front Inside Cover
Letters to the Editor 7
Annual Index 68
Our Authors 70
Monthly List 72

"Your Infantry Career" did not reach us before deadline. We hope to have it in January. Editor.

Because our first issue of 1962 will not be mailed until January, the Editor and Staff of Infantry take this space to extend to all its readers a very Merry Christmas and a Happy New Year.

The Far North

FOLLOWING is a general summary of data about the area of northern operations as related to tactical considerations. Other articles in this issue of *Infantry* discuss more specifically various military problems caused by the factors below.

DEFINITIONS. The terms "cold weather operations," "arctic operations," and "northern operations" are virtually synonymous. Each refers to an area of the world where conditions of climate, and their effects on terrain, force the use of special equipment and special techniques in order to pursue successful warfare. In the summer, operations will be affected by such factors as long daylight, countless swamps, muskeg, lakes, streams, and rivers. In the winter there are such factors as short daylight, snow, cold, ice, and lack of shelter.

Apparently there is no universally accepted definition of "arctic." The military has accepted a definition in terms of temperatures. We say the arctic is an area where the average temperature in the warmest month is less than 50°F, and in the coldest it is less than 32°F. The "subarctic" is the region where the average temperature is not higher than 50°F for more than four months of the year, and where the average temperature for the coldest month is less than 32°F. The northern limit of trees generally defines a line which separates arctic from subarctic, and the two areas together encompass about one-half of the North American Continent and 65% of the USSR. Nearly all forms of topography can be found in these two regions of the earth.

SOIL & VEGETATION. In temperate and tropical areas, soils are formed largely by corrosion and by decaying vegetation. On the other hand, arctic and subarctic soils, particularly north of the tree line, are formed by the disintegration of rock and by alluviation (transformation by water action).

Drainage in the arctic is complicated by both climate and location. Those rivers which empty into the Arctic Sea all flow from warmer lands to the south. When thawing comes, therefore, it begins in the warmer area and works out toward the mouth of rivers. Because of this, there is extensive flooding inland until (if at all) the ice is free at the mouths of the rivers. This causes deposits of alluvial soil over vast areas, making surrounding areas virtually impassable to man and vehicle.

Several soil terms are peculiar to these regions, but are pertinent to adequate understanding of the region. Figure 1 shows a cut-away of arctic soil. *Talik,* at the bottom, is a sandy subsoil which never accumulates enough moisture to freeze. *Ice lenses,* shown here in two of the soil structures, are deposits of pure ice. *Permafrost* is frozen material, sometimes as thick as 900 feet. This material is never penetrated by free water, and never thaws. Thus, any water from thaws of the upper soil, or from flooding, rests on a false water table.

Thermal changes in the soil itself, plus the upward pressures of the normal water table, produce stresses in the permafrost of as much as 28,000 pounds per square inch, frequently causing the ground to blow up in huge mounds. It also develops into horizontal movement or shifting of subsoils which in turn open into great crevasses. These conditions pose obvious hazards to such matters as road and camp site

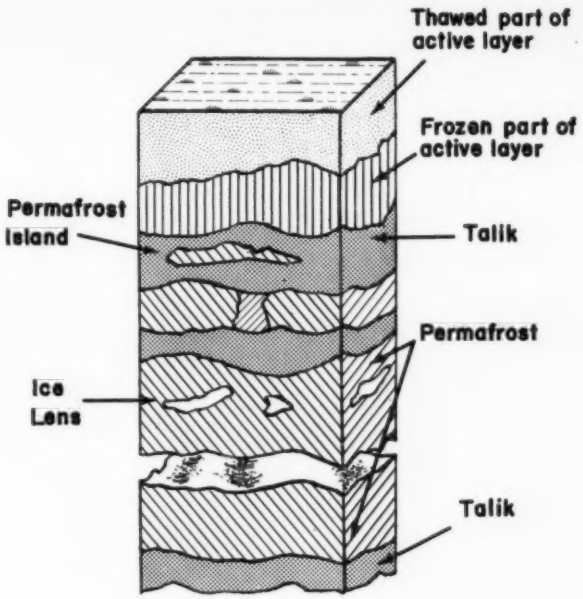

Figure 1

construction.

Forests exist in great abundance in the subarctic, but there is little variation in the types of trees. Most trees are coniferous (cone-bearing), and would provide enough lumber for the world to use for the next two centuries or more.

North of the tree line lies a treeless plain known as *tundra.* There are actually three types of tundra, all of which are transitional. These are bush tundra, grass tundra, and desert tundra, generally in that order from south to north. In *bush tundra* there are dwarf trees, seldom more than three feet tall, and not in large forests. Farther north is the *grass tundra,* a continuous mat of sedges, mosses, and lichens, mixed in with bushes which lie flat on the ground. This tundra lies on top of permanently frozen ground, and soaks up almost all of the moisture which occurs during thaws of the top soils. Bogs which develop amid large areas of mosses and tussocks are called *muskeg.* The *desert tundra,* still farther north, is merely an "oasis" of grass tundra in sheltered hollows surrounded by bare rock, and occurs only sporadically in an immense expanse of no vegetation.

CLIMATE. As indicated earlier, there are wide contrasts in temperatures, precipitation, wind conditions, and daylight in northern regions. Although the temperature at the North Pole seldom drops below −50°, land temperatures drop below −90° in some of the "cold spots" of the arctic. On the North American Continent, there is a cold spot in the general area of Fairbanks - Good Hope - Norman Wells, where extremes of −70° have been recorded often. On the Siberian side, near the town of Verkhoyansk, temperatures of −96° have been reported. However, pure temperature is not the only problem of cold.

Although winds, both in frequency and velocity, are not nearly so great as in more temperate climes, their influence on cold is immense. This is because of what is known as *wind chill,* and derives from the abnormal magnification of temperature cooling. For example, in a temperature of 10°F, a wind of five miles per hour will create a cold *effect* equal to −40°F in still air. This phenomenon is a major consideration in military operations or, for that matter, in the affairs of anybody who is unsheltered. (See inside back cover for windchill chart.)

Contrary to popular belief, the far north does not receive a great amount of either snow or rain. There are exceptions, of course. For example, in Greenland, 40 inches of precipitation is a norm, and in the Aleutians 60 inches is not unusual. However, the arctic's average annual precipitation is less than eight inches.

Fog is a problem with its own peculiarities in this region. There are many kinds of fog, each being identified with a source, but all are primarily *ice fog,* ice crystals which suspend themselves in the air. *Human/animal fog* is caused by perspiration and breath moisture. *Water fog* is caused by overflowing streams. The water products of combustion produce *town fogs, vehicle fogs, weapons fogs,* and *aircraft fogs,* each with its own traits and problems. Because of their obvious hindrance (or advantage, depending upon your point of view) to military operations, these fogs are being studied to determine more accurately their causes, and to determine whether they can be "defeated."

Pitch darkness is a rarity in the arctic areas. In summer, when the ground is generally black, brown, or green, there is sunlight or twilight at all times. In the winter, when direct and indirect sunlight are absent most of each day, the ground is usually covered by snow which magnifies and reflects whatever light exists. Even during periods of maximum darkness, a man clad in dark clothing and appearing on a light field can be seen 100 meters away.

* * *

For a discussion of the effects of northern areas on military operations, please see the article on page 8 in this issue of Infantry.

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RIFLE SQUAD LEADER

by S/Sgt Fred H. Bost, Inf

WHEN measuring one Army leadership job against another to determine which is the toughest to handle, what element should be the deciding factor? Shouldn't the highest priority be given to human involvement—the complications caused by emotional interplay of a number of personalities — particularly in situations where emotions may be prejudiced, irrational or unpredictable?

For example, consider the following situation which developed during a training exercise in Alaska.

SFC Kelly's basic problem, at first, was merely a race against time. He struggled through the deep snow toward his squad area, confident that his CO's orders could be carried out successfully despite the press for time. That is, he was confident until he heard sounds of the fight.

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When he reached the small pocket in the spruce forest, he found his squad tent only half-pitched, the Yukon Stove abandoned, unassembled. Moonlight illuminated a scene of tumbling bodies in the whiteness. At a glance, he saw that one of the fire-team leaders, Perkins, and several others, were trying to separate a struggling pair. He groaned when he recognized Martin and Hulbertson. Kelly had watched their dislike for one another swell and rub raw through the hardships of the past week in the field; evidently, the grueling forced march, just completed, had carried tempers past the breaking point.

Many precious moments were wasted until the men were separated and on their feet. "Stop it!" Kelly yelled. "Listen to me!" He tried to convey a sense of urgency to the men. When they had stopped struggling, he continued, speaking rapidly: "We'll straighten this out later. Right now, the 'Old Man' has ordered me to send a messenger team to Alfa Company. If you remember, we went through their position at the edge of Crosswind Lake. They're moving out at 2100 hours. We have to get to there to stop them. Their movement has been cancelled, but regular commo channels have failed and they haven't received the word."

He paused for a moment and looked closely at the two battlers. "You two are the best skiers in the whole company. I believe you're the only two who can get to

—toughest job in the Army!

WINNER OF *INFANTRY'S* WRITING CONTEST

Alfa Company in time—but you know as well as I that these hills are filled with Aggressor patrols. If you're going to be snapping at each other—if you can't trust each other and work as a team—it might mean capture. I don't have to tell you how serious it can be if Alfa Company doesn't get the word."

His voice softened. "Now, give me a straight answer. Are you men enough to forget your differences until you can accomplish this mission, or have I been overestimating you all these months?"

Their sheepish response brought a warm smile to his lips. He slapped them on their backs. "Okay, then," he grinned. "Get going! I'll tell the Captain that the message is as good as delivered."

In this instance, Sergeant Kelly was not required to call upon any technical knowledge. Even his tactical decision was limited. The buddy system required that he use two skiers; the time element required that he use his two fastest skiers; but human emotions had turned a routine course of events into a ticklish situation. Fortunately, Sergeant Kelly was aware of his men as individuals; because of this, he sensed the proper approach in appealing to them, and, despite their anger, they were willing to give full cooperation to accomplish the mission. He had successfully dealt with a problem caused *by human emotions only.*

HEREIN lies the real difficulty in the Army's toughest job —not the technical knowledge nor the tactical proficiency, but the recognition of prejudices, ambitions, jealousies, conflicting personalities and weaknesses in character which may cause trouble within the squad; meeting and mastering the dozens of daily problems caused by these character traits; finally attempting to use the results of each of these problems as a building block in forming the solid wall of unity and harmony required within the squad if it is to work as a team.

Now let's not misunderstand. From the viewpoint of technical knowhow or tactical adaptability, the Infantry squad leader's job must still be considered the Army's toughest, even though it is within the area of human behavior—strengths, weaknesses, fears and prejudices—that we find the sharpest challenge to successful leadership. A quick rundown through the manuals discloses an impressive

mass of technical knowledge required of a competent squad leader, but, for other MOSs, similarly impressive lists may also be compiled. How then, when comparing technical requirements, can the squad leader's job be judged tougher than any other? In this area, thought should be given to the conditions under which the technical knowledge must be applied and the effect these conditions have on the behavior of the men involved.

The entire Army is geared to place the Infantry squad where it can destroy or neutralize the enemy. It is during this time of confusion and danger that the squad leader must be able to apply his knowledge, and it is for these uncertain moments that he must constantly be preparing. To assure a firm base for the technical requirements, his preparations should always include a study of the human factors which may affect the issue.

For instance, a good squad leader thinks not only of the firepower of his squad as a whole, but also the part that each individual plays in maintaining the firepower. If he has trained Sp4 Evans well in the use of his automatic rifle, then the man knows the characteristics of the weapon and is thoroughly familiar with it. He has been tested for knowledge, speed and accuracy. But the good squad leader goes beyond this. He is constantly judging, re-evaluating, searching for weaknesses, asking, "Does this man have the temperament and self-possession that will allow him to keep his head out of the foxhole and deliver continuous, concentrated fire on a close, hardpressing enemy?"

The same principle of considering the human element applies equally well to tactics. Offensive and defensive tactics of the rifle squad are normally determined by the mission of the platoon. Yet, in the stress of battle, a squad leader's decision might be a determining factor in the outcome. Here again, pondering the personalities of the men within the squad, *before the moment of truth,* may mean the difference between success and failure. Consider Private Blakely, who has a tendency to grow confused and fearful in darkness. The personality of the man assigned as his foxhole buddy may mean the difference between repelling a vicious night attack or annihilation of the squad.

Now the question arises: "But isn't this just a basic leadership problem? Personality clashes and character problems may exist when any two people meet. They arise wherever people gather. Shouldn't this indicate that the problem is the same at all levels of command?"

But is the problem *really* the same at all levels of command? Let's compare.

EACH leader, at every level within the Army machine, has a specified number of subordinates working directly under him. In theory, each leader need exercise control only over his *direct* subordinates in order to insure smooth functioning of the machine. Now, what are some of the factors which affect the difficulty of leadership? The first thing that comes to mind is "numbers." It is reasonable to assume that the fewer men a leader must control, the easier becomes his control problem. The Infantry squad leader has ten subordinates under his direct control. *How many other leaders in the Army structure have that many direct subordinates?*

Let's consider two other factors which have a tendency to ease the leadership problem—the maturity and experience of subordinates. The higher the headquarters, the more experienced and mature are the personnel found working there. In a leader-follower relationship, this combination of maturity and experience generally makes for smoother action. The leader has the confidence that the men know and understand their jobs. He can rest easy with the thought that only a minimum of supervision is required of him, that his subordinates are often career men, in the service through choice, generally picked for their present jobs because of high standards of past performances, and, because of this, most have a deep respect and concern for the job they are doing.

This assumption of obligation and responsibility holds true down the entire line to the platoon level. Of course, it follows, generally speaking, that the lower the level, the less maturity and experience are evident. Nevertheless, the average rifle platoon is staffed with squad leaders who have at least five years' service behind them and have long since committed themselves to attain professional status as Soldiers.

Except for the fire-team leaders —two subordinates defined as fighter-leaders whose function is to

lead by example—maturity and experience seldom exist at squad level. Every squad leader is vexed with problems caused by immaturity within his squad. The average member of the squad is not long out of high school and has brought with him, from civilian life, attitudes that are not conducive to disciplined living. Every squad, at one time or another, has had to work against the drag of the uncooperative draftee, or the young enlistee, secretly picturing himself as John Wayne or Burt Lancaster, who has disappointedly discovered that "it isn't like the movies at all!" Squad leaders are constantly battling cynicism, "hip" notions, bigotry, prejudices, and "wise-guy" attitudes, in order to forward the ideals of teamwork and harmony necessary to a healthy squad.

No, it is evident that the problems of leadership are *not* the same at every level of command. When it is realized that a month seldom goes by without a change in the personnel of the average squad—men being reassigned, discharged, going to service schools, etc.—it becomes apparent that the training of a squad is a constant and gigantic task.

The job of taking young, inexperienced men, instilling in them a sense of duty, teaching them to live together, training them, toughening them—this job calls for patience. Further, to study the men, evaluate them, take advantage of their individual strengths and take steps to protect the squad against their weaknesses—this takes understanding. And still further, to build a unit having *esprit de corps,* one that considers the mission first, the welfare of the squad second, and the interests of the individual last, one that functions cheerfully whether faced with the boredom of monotonous garrison details, the nerve-tightening fatigue of rough field duty, or the near-panic conditions of close combat—this takes skill.

WHEN this point is reached and recognized by others, if the leader struts a bit when he walks, if he stands a little taller and seems a little cockier, shouldn't it be expected? After all, he's proven himself a success as an Infantry squad leader—the guy with the toughest job in the Army.

From the Author: "Many thanks for your wonderful words about my article on the Squad Leader. The article was my first attempt at non-fiction, and I wrote it with misgivings, feeling my way, more or less. But I felt that the subject was a natural one, and my feelings on the subject have always been so strong that I decided to give it a try. Rest assured that you will be hearing from me again in the near future."

From the Editor: We'll be delighted.

Mr. Gatling, Take a Bow

• I was delighted to read (May-June) an article concerning the M60 machinegun in the squad. I refer to Colonel McDowell's "Minor Changes—Major Results." After messing around with Infantry platoons for years and studying combat lessons of World War II and Korea, I am convinced our salvation rests in firepower.

I think our tactics should be reorganized around machineguns. Presently we tend to emphasize seizure of terrain rather than destruction of the enemy, even though one is supposed to achieve the other. Our tactics should emphasize continuous forward movement of machineguns by alternating fire teams. The objective would be taken by what is essentially infiltration. The assault would be an exception, used only when it was apparent that the enemy was trying to break contact.

A word on "Assault." While I have no bone to pick with how it is done, I question our doctrine on the subject. Our doctrine is unrealistic because it presupposes that the enemy will be pinned down by our supporting fires and that we know exactly where the enemy positions are, two conditions seldom obtainable on the battlefield. I think we should recognize that enemy positions are seldom uniform and in most cases are in depth. Herein lies the point. Infantry in the attack uses primarily small (frequently semi-independent) actions against enemy strong points. The platoon leader who goes around looking for a line to assault can spend a lifetime doing so without success. Further, lining the platoon into a skirmish line can result in misery for a lot of people if some clown on the flank with a machinegun didn't get the word that he was supposed to be pinned down.

So far as I'm concerned, *Infantry* is the only magazine available that deals with "Dirt Soldiering," which is the only kind of soldiering that's worthwhile.

Capt Edwin W. Chamberlain
Hqs, 2d BG, 4th Infantry
APO 139

Your ideas, in detailed form, have been relayed to the three Departments at USAIS directly concerned with these problems. Ed.

From Fort Holabird

• We would like to have permission to reproduce Capt Davant T. Williams' article on "Make Interest Pay Dividends" in the July-August 1961 issue of *Infantry.* The reproduced material will be distributed among U. S. Army Intelligence School instructors for information.

W. Charles
Lt Colonel, Infantry
School Secretary

U. S. Army Intelligence School
Fort Holabird, Maryland

Granted, of course.—Ed.

Continued on page 39

Effects of Northern Regions on Military Operations

GENERAL

Snow and extreme cold, two characteristics of northern regions, present problems which require special equipment and techniques. Much equipment is in use only during the winter and must be stored during the summer.

Seasonal changes sometimes completely halt all but local operations. Trafficability during the annual spring breakup and summer season is so reduced that its effect cannot be over-emphasized. Low ground-pressure tracked vehicles often are the only means, other than the foot travel, of cross-country movement. Heavier equipment is tied to the roads. Aircraft may be used if landing areas, maintenance, and logistical requirements don't preclude their operation.

PERSONNEL

Morale. Any emotionally stable person can adjust to life in the north with proper indoctrination and motivation. Morale is affected by the deathly silence accompanying a decrease in temperature, and by the depressingly long winter nights. But the well-trained, well-motivated, well-led Infantryman, with confidence in his ability to accomplish his mission, will create few morale problems.

Replacements. Replacements should receive six weeks' cold weather training in weather and terrain conditions similar to those in which they will be employed. Personnel not trained in arctic operations will soon become more of a burden than an aid to the unit.

INTELLIGENCE

Concerning the enemy. Accurate information must be secured concerning enemy *unit* oversnow capability, type and efficiency of winter clothing and equipment, types of oversnow vehicles, and special techniques. Divisional units are the primary source of this information. Air reconnaissance may disclose enemy supply and command installations or troop concentrations.

Counterintelligence. The problem of enemy agents' operating in our rear will be minimal in winter. Camouflage will be more difficult, because troop installations and weapons may be revealed by ice fog, and roads and trails will be easily identifiable from the air.

Weather and Terrain. Weather and terrain are probably the greatest influencing factors in the work of the intelligence officer in the north. Severe temperatures, snowstorms, and blowing snows are often an advantage to the attacker, and in areas of rapidly changing weather, reports must be made frequently and analyzed for their effects on operation plans. Studies of the terrain, in conjunction with weather forecasts, will form the basis for operation plans. Sudden changes in terrain conditions, especially those concerning approach routes in winter, must be detected and pointed out by the intelligence officer.

Maps. Extensive use of aerial photos and photomaps must be made, as very little of the northern regions has been accurately mapped.

OPERATIONS

Organization. Most units will require some modification prior to being employed in the north. This may be minor additions or deletions of a few men, or major changes of subordinate units. The extent of modification will depend upon the mission, location, nature and function of the unit equipment or weapons, and the time of the year.

Weapons. Most Infantry weapons are suitable for use in the north. The problems caused by metal brittleness, freezing lubricants, and water condensation may be overcome by proper maintenance. The effect of shells with super-quick fuzes is reduced by deep snow. The bursting radius of an 81mm mortar round, for example, may be only 3 feet if it lands in 12 inches of snow. VT fuzes will not function below −20 degrees F. Ice fog forming around the muzzles of weapons reduces visibility and may disclose positions to enemy observers.

Equipment. Frozen soil favors tank employment, but deep snows and the subarctic forests may hinder their use. Special tracks and grousers may be required. Hydraulic systems operate sluggishly, if at all. Snow 12 inches deep will stop wheeled traffic, leaving oversnow vehicles as the primary means of motor transportation. In summer, much of the terrain is marshland or muskeg. Once the top of this is ruptured, the mud offers no support until the permafrost is reached, sometimes 6 feet down. The muskeg may also be interspersed with large glacial boulders just below the surface, waiting to damage suspension systems and tracks.

Nuclear Weapons. Blast and thermal effects from nuclear weapons are increased by hard, frozen surfaces, but the special clothing worn by personnel offers extra protection from the heat of the detonation. The long nights and reflectivity of snow offer increased opportunities for exploitation of night blindness induced by a nuclear detonation. Snowfall on a contaminated area will reduce the effect of neutron-induced gamma radiation.

Since winter operations are more dependent than others upon adequate logistical support, these elements may be considered as

primary nuclear targets. Troop elements, through normal passive defense measures, may be far less remunerative targets. Poor maps make target location difficult, although celestial navigation techniques may provide some help. Intense cold presents serious maintenance problems to both weapons and delivery systems. The presence of ice fog and the temperature-air density relationship must also be considered by the nuclear weapons employment officer.

LOGISTICS

Supply. All supply problems are magnified. Critical points in the logistical support plan must be anticipated and protected against all possible contingencies. Failure to deliver supplies needed in the northern regions has worse effect than in more temperate zones.

Evacuation. Plans for medical evacuation must include means for keeping the patient warm. To reduce evacuation distances, more medical installations may have to be established closer to the front.

Transportation. The lack of an adequate road net is another problem for the supply officer. Since roads are few in number, enemy aircraft will have a smaller search zone, increasing our vulnerability to air attack. In open terrain and against an enemy having strong airpower, movement may be possible only during periods of low visibility. Maintenance on the existing routes requires time, usually scarce material, and large numbers of troops. Movement of supplies will be accomplished by a combination of wheeled vehicles, tractor trains, oversnow vehicles, sleds, aircraft, and animal and man packs.

Water routes are common during the summer, but are not generally recommended. The rivers, if ice-free, tend to meander or intermingle with flooded areas and sometimes lose their identity.

Services. Providing heated shelters for troops, command posts, kitchens, medical and service installations, and some supplies may become one of the greatest problems facing the logistical officer. Several different type shelters have been developed, but much research is still required.

This material was extracted from Problem A2011, C&GSC, by permission.

Glossary of Arctic Terms

THE following terms are extracted from an extensive glossary, and are primarily terms which are not defined in other articles of this issue.

Ahkio—A Finnish term, derived from the Lappish word *akja*, for an open, canoe-shaped sled. Diffused through Scandinavia, the ahkio was adopted by the military as an item of equipment for oversnow movement. The form currently used by the US Army is constructed of light wood, aluminum, or fiberglass; it weighs approximately 25 pounds. Loaded with 100 to 200 pounds, it can be pulled easily by a man on skis or snowshoes.

Albedo—The percentage of the incident energy (the incident visible light) that is reflected by a natural surface such as ground, water, snow, or ice. Snow has a very high albedo; however, the albedo decreases as the moisture content of the snow increases or as the snow is discolored by dust or other darkening material.

Arctic Hysteria—A reaction to winter conditions peculiar to the high latitudes. Solitude, cold, darkness, and resultant inactivity, cause depression. The "spring tiredness" of the Finn; the "hunger for light" of the Russian. When depression becomes extreme, reaching the breaking point of an individual's endurance, it explodes as arctic hysteria.

Aurora Borealis—A luminous and sometimes moving glow in the upper atmosphere of the Northern sky, the cause of which is not definitely known, but which is believed to be ultraviolet radiation from the sun. This radiation is deflected by the earth's magnetic field toward the magnetic polar regions where in combination with the rarefied gases of the upper atmosphere it becomes luminescent. May be white or in the colors of red, green, or yellow.

Blackout—Radio fadeout due to ionospheric disturbances, often accompanied by a magnetic storm, prevalent in the Arctic and Antarctic. Also called *arctic blackout, polar blackout.* Blackouts differ from the fadeouts of lower altitudes in that they may last for days or even weeks, while fadeouts last for a few hours at most.

Cold Injury—An inclusive term applies to injuries resulting from cold. Injuries arising from exposure to temperatures below freezing are called frostbite; injuries resulting from low temperatures, but above freezing, are termed trenchfoot, immersion foot, or shelter foot, depending on the conditions of exposure.

Corduroy Road—Road surfacing for soft or marshy ground or thin ice, made by laying whole or split logs crosswise, either on the natural surface or on logs or planks placed lengthwise.

Crampons—Hinged metal frames which may be attached to shoes or boots, and from which spikes project downward to facilitate walking on ice or hard snow.

Freeze up—The period in the autumn just before the ground is frozen for the winter. Rain and alternate periods of freezing and thawing result in a soggy terrain which presents difficult problems in transportation and tactical operations.

Frost—A light, feathery deposit of ice formed by the sublimation of water vapor on objects with surface temperature below freezing. Also called *rime.*

Continued on page 32

Mobility in Northern Latitudes

Capt Henry E. Vincent, Inf

MOVEMENT BY FOOT

BECAUSE of the limitations of our vehicles in deep snow, the Infantryman must be able to move cross-country under his own power. To help him, we have skis and snowshoes. Standard issue snowshoes are of two types, the trail and the bearpaw, and both can be used with all types of military winter footgear. The trail-type snowshoe is long, with a rather narrow body and upturned toe, and weighs approximately 6.5 pounds. The upturned toe rides easily over the snow and minor obstacles, and thus this snowshoe lends itself best to cross-country marches in deep snow.

The bearpaw snowshoe is short, wide, and oval in shape, with no frame extension, and is preferable to the trail type for close work with weapons and vehicles, in heavy brush, or in confined areas. Because the bearpaw will not glide over snow, movement is slow in any type of terrain. Maintenance requirements are negligible, and little skill is required to become proficient on snowshoes, one day of instruction being sufficient. Excellent physical condition, however, is a must for all personnel using them.

In military skiing two types of skis are used, cross-country skis and mountain skis, the former being most widely used. The basic difference between the two types is that the mountain ski is wider and has narrow steel strips along the edges of the running surfaces, permitting the skier to obtain better control of his skis when operating in mountainous terrain.

Trained individuals on skis can execute cross-country marches on roadless, variable, and snow-covered terrain more efficiently and quickly than on snowshoes or on foot. Unlike snowshoes, skis require much training by the user. To properly train a novice to operate on skis proficiently in all types of terrain requires eight weeks of intensive practice. The sliding characteristics of skis increase speed, mobility, and rate of march, making them less tiring than snowshoes or foot travel. In addition, individuals on skis are able also to cross frozen lakes and rivers which would not support a man on foot.

Units operating in the arctic and subarctic may require the use of man-hauled sleds to move shelter gear and supplies for short distances when wheeled or tracked vehicles are unable to operate. For this purpose, the standard issue item is a boat-type sled (ahkio) with a capacity of some 200 pounds. It is constructed of a light-weight plastic material, weighs about 30 pounds, and has a canvas to cover the load. Normally, a team of four or five men tows the sled, although it can be pulled by fewer men in favorable terrain.

MOVEMENT BY VEHICLE

IN MODERN warfare the vast amount of supplies needed to feed, clothe, shelter, and equip our fighting forces are of little use if suitable means to deliver them to

With the bearpaw snowshoe, movement is slow in any type of terrain.

The "ahkio" is used to haul up to 200 pounds of cargo for short distances when other means cannot be used.

the individual are not available. To accomplish this delivery mission and to provide the soldier transportation, wheeled vehicles, tracked vehicles, and aircraft are used.

Wheeled vehicles have a very limited cross-country capability in snow more than 12 inches deep. However, maximum use should be made of them where roads exist or can be constructed with an acceptable expenditure of effort. This will conserve fuel and save time spent in vehicle maintenance.

The best aids to movement in northern regions are tracked vehicles which can move over muskeg and tundra, through brush and light timber, and which can break trail in deep snow.

Probably the best known of these vehicles is the M29 cargo carrier, called the "Weasel." It will transport four men and their equipment, and is used extensively by units stationed in Alaska. The M29 has an excellent oversnow capability because of its very low ground pressure (1.6 pounds per square inch). It can tow a 1-ton or ¼-ton trailer, and is an excellent means for towing ski troops. Unfortunately, however, the M29 has only a small cargo compartment and is thus limited as a cargo carrier, ambulance, or mobile command post. The track and track suspension system are the main sources of trouble in operation of the Weasel. Sticks and snow are picked up and impacted in the bogie wheels, causing the track to come off, and forcing the driver to make frequent stops to clear the tracks.

The amphibious cargo carrier M76, called the "Otter," is a lightweight, low ground pressure, unarmored, full-track amphibious vehicle, capable of being transported by air. It will carry nine passengers and the driver, or 3000 pounds of cargo, at a sustained speed of 25 mph. The Otter does not have as good an oversnow capability as the Weasel, because of a higher ground pressure; however, it will tow a 1-ton or 2-ton sled in snow

The M29C "Weasel," best-known oversnow vehicle, can carry four personnel, tow troops, or haul cargo sleds.

The M76 "Otter" can tow a two-ton cargo sled in snow up to 30 inches deep.

The Army uses tractor trains to meet heavy logistical requirements.

Though harassed by the weather, aircraft have proved to be invaluable in supporting military operations in the north.

up to 30 inches in depth. This vehicle often produces dangerous gas fumes in the driver and cargo compartments. Personnel must be warned to keep sufficient ventilation to prevent asphyxiation. The vehicle has a cross-drive transmission with pivot steering, thus easing handling and causing less driver fatigue than the M29. The Otter has 16 pneumatic tires running on the tracks, and when operated over rough terrain in extreme cold, flat tires are common. If not fixed promptly, track failure may develop.

THE FULL-TRACK, cross-country vehicle now in use is the M59 Armored Personnel Carrier. This combat vehicle may be used for many purposes, and is considered to be the best vehicle available for use by combat troops in the north. As a squad carrier, it transports a full rifle squad and its equipment. In an emergency it can furnish heat and shelter and sleeping accommodations for the squad. It can also function as a cargo and weapons carrier, reconnaissance vehicle, a command post, or an evacuation vehicle capable of transporting five litter patients. The watertight hull provides an amphibious capability, and some protection against radioactive fallout. The new armored personnel carrier, M113, has the same general characteristics as the M59, but is lighter and has a greater cruising range.

It should be kept in mind when planning to use the three tracked vehicles mentioned above that troops may be transported inside and skiers towed outside the vehicles simultaneously. Frequent rotation of each group will prevent fatigue.

Tanks are designed for cross-country mobility and are capable of operating in deep snow with little difficulty. In addition to their normal tactical missions, they may be employed to transport personnel in an approach march, to tow sleds, and, in an emergency, to tow skiers. To guard against frostbite, commanders must consider windchill factors before moving troops on tanks for any appreciable distance. Tank tracks provide excellent routes of advance for foot troops, especially in the assault phase of the attack.

Tractor trains are the answer to one of the most difficult problems in northern operations, that of transporting large amounts of supplies. The Army has conducted several exercises using tractor trains to provide heavy logistical support to tactical units, and has proved that tractor trains can be used satisfactorily. Diesel-powered, crawler-type tractors (similar to the Caterpillar, D-7, D-8, and D-9) are used, diesel power being preferred because of its dependability in cold weather, and its lower fuel consumption rate. Cargo is transported on 10-ton and 25-ton bobsleds. These trains travel at a speed of 2 or 3 mph, and usually operate on a 24-hour basis. Tractors should be equipped with angle-dozer blades for removing snow, breaking trail, and protecting the radiator from fallen timber. Tracks may be modified by welding steel strips in a staggered pattern to the existing cleats, increasing the towing capacity by about 50 per cent.

ARMY AIRCRAFT also play a vital role in combat operations in northern areas. Both helicopters and fixed-wing aircraft have proven to be invaluable for supporting combat units in the far north. Even though weather and visibility will reduce the capability of aircraft for short periods, they are still a vital means of mobility.

Vehicles of all types must be equipped with cold weather starting aids, and with equipment to protect drivers and crew or passengers. Winter equipment is standard for most of the vehicles presently in use; however, it is necessary to improvise for some types.

Vehicles presently organic to our combat units can provide adequate mobility even though they have limitations and some undesirable characteristics. Maintenance in extreme cold is difficult and time-consuming, but must be performed at regular intervals despite discomfort to personnel. The capability of the vehicles depends heavily upon the capability of the driver. With regular maintenance by well-trained drivers our vehicles will give us the mobility needed to operate in the "Land of the Midnight Sun," one of the most beautiful yet treacherous areas of the world.

30¢ A POUND

Capt Warren T. Prescott, Inf

CAPTAIN Bixley turned left onto Douglas Avenue and headed north toward Edgewood, a shady residential area of Fort Carter. "Six weeks," he said to himself, "six weeks of living out of a suitcase. Well, it will all be over today. Let's see, the van was due at the house at ten this morning. They should just about have the unpacking done by now."

It hadn't been all bad, of course, the cross-country trip, thirty days leave—even his in-laws had been reasonably glad to see him after three years — but, he thought, there's nothing like being settled again in your own home. A faint smile crossed his face as he contemplated his homecoming. Then it faded.

The large green van was still in the driveway when Captain Bixley pulled up in front of his newly occupied quarters. The usual array of empty crates, multi-colored blankets and moving dollies were scattered around the front lawn, and the ever-present gang of neighborhood kids, attracted by the spectacle, was standing by. Vaguely Captain Bixley sensed that they were strangely quiet and seemed to be staring at him as he headed up the front walk, but he shrugged it off, climbed the steps, and swung open the front door.

Captain Alton V. Bixley, Infantry, had seen the results of war. He had passed through Seoul in both directions in 1950, and a trip to Pearl Harbor during his tour in Hawaii had confirmed for him the destructive nature of modern warfare. But he was totally unprepared for the sight that greeted him in his living room on that humid July evening.

An assortment of broken glass that had once been recognizable as a 57-piece set of china covered the top of the dining room table (one corner of which was resting on a packing crate which served as a functional if not artistic replacement for a missing leg). The coffee table, which he had painstakingly shaped from strips of mahogany at the Post Craft Shop several years ago, was warped and gouged almost beyond recognition. At first glance the upholstered sofa sitting serenely in the center of the room seemed strangely immune to the damage which surrounded it; however, closer inspection revealed the stained and mildewed cushions and the faded fabric covering. In the far corner of the room, protruding from the side of an unopened crate, was the jagged, broken arm of his favorite chair. Through the opening in the box, the battered remains of its electric vibrator unit could be seen.

Captain Bixley remained motionless in the doorway for several moments. Then, turning to the bulky man in coveralls, he gasped, "What in the hell did you do with these things, tow them behind the ship to San Francisco?"

"We're awfully sorry, Captain," replied the agent. "The van which was carrying your goods was involved in a little accident several days ago. Got caught in a heavy rainstorm just outside Center City and the trailer jacknifed on a curve. We should have been notified of this before the goods arrived, but the telegram just got here this morning. However, you can be assured, sir, that we will do everything possible to expedite handling of your claim. We will have an adjuster here tomorrow. He'll arrange for estimates and repairs on the items with minor damage, and for cash settlement on the lost or destroyed goods up to the limit of our legal liability."

"What do you mean, the limit of your legal liability?" asked Captain Bixley.

"We are limited by Federal Antitrust statutes from paying in excess of 30¢ per pound per article for damage or loss during transport of your goods. This law was passed to restrict inter-state carriers from using damage claims as a form of rebating to certain firms. In cases such as this, it certainly creates problems though. Did you purchase commercial insurance to cover this shipment"?

"No," replied the Captain, "I didn't think I could afford it. That sure looks like one of the ten worst decisions of 1961, doesn't it!"

Estimates of the damage and loss of this shipment showed that to restore Captain Bixley's household goods to the condition they were in on the day they were packed in his overseas quarters would cost $975. Settlement with the van lines resulted in repairs to those articles which were not damaged beyond the carrier's limit of liability, and a check totaling 30¢ per pound for the other items. Captain Bixley

was left with a loss of approximately $600, with no insurance coverage or further recourse against the carrier. What steps are left to him? Where can he turn for relief from this loss that was caused through no fault of his own?

The Military Personnel Claims Act of 29 May 1945 (as amended), implemented by AR 25-100, provides authority for the Secretary of the Army to receive and pay claims of military personnel or civilian employees, their authorized agent, surviving spouse, or legal representative, for damage or loss of tangible personal property incurred incident to the service of the claimant. The property which is the subject of the claim must be determined to be reasonable, necessary, useful or proper in the claimant's attendant circumstances, and the loss must have been caused through no negligence on the part of the claimant. Circumstances which may give rise to payable claims under the regulation include:

- Losses of personal property occurring in government quarters, resulting from fire, flood, hurricane or other serious occurrence, or by theft. (Claims arising from these sources in areas outside of CONUS will be recognized whether the loss occurred in government or private quarters.)
- Property lost or damaged while in government custody in a warehouse, office, hospital, or baggage dump provided such storage was authorized by competent authority.
- Claims for damage to motor vehicles occurring when used in the performance of military duties (not including travel to and from work).
- Loss due to enemy action.
- Transportation losses to include damage or loss of personal property transported by a common carrier, contract carrier, agency of the government or carried in a private conveyance when such transportation is pursuant to orders or in performance of military duty.

Captain Bixley's loss is probably recoverable under this regulation. The damage and loss occurred while in the hands of a common carrier; the loss did not result from any negligence on the part of the claimant; and the shipment was authorized by government orders.

Later on, Captain Bixley paid a visit to the Staff Judge Advocate section and related the facts of his case to the Post Claims Officer. There, he was told what steps must be taken to establish his claim against the government. First, a demand for payment must be made against the last common carrier of the property. This demand should be for the same items and in the same amount as the claimant later intends to file against the government. He had accomplished this step and had received payment from the van lines as a result of the demand. Further, if the goods were insured against loss or damage, a demand for payment must be made against the insurer. Copies of the demands and any replies thereto must be retained for submission with the claim.

Second, estimates of the cost of repair of damaged items, or of the value of lost or destroyed items, must be obtained from a reputable firm qualified to make such estimates. Normally one estimate is sufficient. Any reasonable expense incurred in obtaining an estimate may be included in the claim. As in Captain Bixley's case, many van lines employ qualified estimators to provide this service. These estimates form the basis of the amount of your claim and should be obtained prior to filing a demand against the carrier to insure that this demand includes all items you later intend to claim under AR 25-100.

Next, if any item is lost enroute, a reasonable effort must be made to trace the missing property. In the case of household goods, the van lines will normally trace missing items, and a statement from them that they were unable to find the property will usually suffice. Finally, one copy of travel orders authorizing shipment of your household goods, together with copies of all correspondence with the carrier or insurer, estimates of repair, and any other evidence establishing your claim, should be submitted to the claims office. Normally, the claims officer will help you in the preparation of the claim form (DA Form 1089). Information to be placed on this form includes, among other things, the purchase date and amount paid, and the cost of repair, or value when lost or destroyed of the claimed item.

In Captain Bixley's case, his claim for the difference between the amount received from the carrier and the extent of his total loss was approved, and, with a small deduction for depreciation, was paid.

Persons who have not had occasion to file claims under this regulation recently will find that the service has improved greatly. Gone are the days when all documents were required to be filed in triplicate, and months passed before the claims were finally settled. On 1 October 1959, authority to pay claims under AR 25-100 was delegated to Post Commanders, and greater discretion was granted to the Staff Judge Advocate in the determination of documents necessary to establish valid claims. Payment is now made by the local Finance office, and in many cases the investigation by the claims officer and subsequent authorization to pay the claim is completed in less than one week from the time of filing.

The case of Captain Bixley was an unusual one from the standpoint of the amount of damage incurred. However, it is a rare move that does not result in some minor damage or loss to a service member's possessions, despite the care taken and the fine service provided by most common carriers. It has long been recognized that the personal property of members of the Armed Forces, by reason of the nature of their service, is often subjected to greater risk of loss or damage than the personal property of permanent members of communities. Congress has provided the Military Personnel Claims Act to insure that these losses are promptly and justly paid.

ARCTIC NAVIGATION

Capt Richard J. Kattar, Inf

Our battle experience has provided voluminous information concerning aids to navigation in temperate, semi-tropical, and tropical areas of the world. We have fought and moved extensively over such areas as North Africa, the South Pacific Islands, and western Europe. Consider, however, the tremendous portion of the earth's surface located in the northern latitudes where our armies have had only limited experience.

The vast land area within the northern latitudes is subjected to severe climatic changes. In addition to the normal procedures, every individual must be familiar with conditions peculiar to cold weather regions and with the techniques applicable to navigation there.

Maps are virtually non-existent, and a great reliance is placed on aerial photos. Aerial photos are made more often in summer than in winter, and these will show all identifiable terrain features and landmarks. However, during the winter months, most of these features are covered with snow. Only the major landmarks — rivers, major ridge lines, man-made features —will show.

In the winter, short daylight, fogs, snowfall, blizzards, and drifting snow, especially in barren areas, drastically limit visibility. At times an overcast sky and snow-covered terrain create a condition of visibility (called white-out) which makes recognition of irregularities in terrain extremely difficult.

The magnetic declination (G-M angle) normally is very large in northern regions. If it is not taken into consideration, it can cause great errors in direction.

The problems of ground navigation in the north may appear insurmountable. However, by applying basic techniques of navigation, with suitable modification, and by properly using all navigational aids available, accurate cross-country movement can be accomplished in cold weather regions.

The absence of landmarks makes the compass the prime direction-finding instrument, supplemented by maps and aerial photos when available. With these tools, a modified technique of dead reckoning can be used effectively. This technique will provide for locating a position at any time by using the last determined position, the direction taken, and distance traveled.

When an area to be traversed is lacking in landmarks, sufficient compass legs are established to direct you to your objective. Distance between legs must be predetermined in order to change direction at the terminus of one compass leg and begin the next.

A means of determining distance traveled must be used. For the most part, troops will be traveling on skis or snowshoes. Accurate pacing under these conditions is not feasible. The recommended method for accurate ground measurement is the use of wire or rope (knotted or cut, for example, to 50 meters) used by two individuals. With such a measuring device, an accurate log of movements must be kept.

When maps and aerial photos are available, and when prominent features do exist, a modification of the dead reckoning technique can be used. When making a map or photo reconnaissance, select prominent linear features which run perpendicular to the axis of advance, such as main ridges, rivers, and lakes. Using these features as checkpoints provides a means for determining distance traveled.

The boxing-in technique (see "Box Yourself In," *Infantry*, March-April 1961) is also useful in maintaining direction when prominent linear features are found which run *parallel* to the desired direction of movement.

Noting certain peculiarities of the area will also aid orientation. Snow fields, just as desert sands, will fold and shape in a characteristic manner as determined by the prevailing winds. They usually remain consistently oriented in a given direction.

Snow texture will often indicate general directions. On the southern side of a ridge, which is exposed to the sun for the major part of the day, the snow will be crusted from melting during the day and freezing at night. On the northern side, snow will be powdered and crystalline.

From the hard experience of great northern explorers comes one outstanding lesson: the principles of navigation do not change; rather they are modified to meet the peculiarities of the terrain over which one must move, and the climatic conditions which affect this terrain.

HEAVY MORTARS in Northern Operations

Capt Charles W. Strang Jr, Inf

APPROXIMATELY 45 percent of the North American continent and 66 percent of Eurasia fall within the boundaries of the so-called northern regions. In these areas, temperatures below -20° F, along with many feet of snow, are commonplace during the winter month.

The United States Army, realizing the likelihood of having to fight in cold weather has conducted annual winter exercises since 1947. These have been rather small-scale operations involving a limited number of troops. At the conclusion of the annual exercise, a report of a general nature is submitted, and several broad problem areas are pointed out. Unfortunately, little information is recorded concerning techniques developed by the various small units to maintain their operational capability. Each year mistakes are repeated by the units, and little progress is made in solving some operational problems because of the limited time spent on the exercise. This is particularly true of heavy mortar firing at temperatures below 0° Fahrenheit.

A heavy mortar platoon that is well trained for operations in the more temperate zones may "fall flat on its face" when it fires for the first time in sub-zero temperatures. Tasks which are simple to perform in normal operations will become major projects in the extreme cold. Problems encountered include difficulty in emplacing the weapon, in adjusting the proper charges on the base of the round, and in adjusting fire.

The platoon must be mentally and physically prepared for the hardships it will face. Emphasis must be placed upon crew drill in Arctic clothing prior to firing with live ammunition. This should take place during an orientation period after the unit's arrival in cold weather.

Prior to its move to northern regions, the platoon should take its 4.2 inch mortars to Ordnance so that proper Arctic lubrication may be placed in them. After the weapons and their ammunition arrive in cold weather, they should become "cold soaked" and be kept that way. If a weapon is taken into a warm building or tent, the metal begins to sweat. This condensation must be removed to prevent corrosion. If the weapon is taken outside without removing the moisture, it will become covered with an icy coat and will be more susceptible to misfires and poor operation. It is also important to keep the surface of the weapon clean and free of lubrication, and the muzzle covered to prevent snow from entering.

If the area has little precipitation, it will be barren much like the Thule region of Greenland. Here mortar units must either blast a hole to emplace a baseplate, or must use picks to chop into the frozen ground. Without further cushioning, however, if the weapon is fired by simply placing it in the hole, the baseplate will chip and crack. A temporarily effective cushion can be provided by placing fiber and wood from the ammunition boxes under the baseplate. Regardless of what cushion is provided, though, the weapon will be subjected to great strain when fired, and weak points on the bridge and baseplate, made brittle by the cold, may develop into cracks.

The baseplate should be weighted down to reduce its shifting while firing. This can be accomplished by using boulders, or sandbags filled with stones that can be broken free from the frozen ground.

In areas where there is more snow, such as in Alaska, different problems will confront the platoon. It is impossible to fire the weapon from atop the snow because the

tremendous recoil will drive it into the snow without ever reaching a firm base. In order to obtain a firm seating for the baseplate, you may have to dig away many feet of snow. In regions where there are trees, the clearing thus dug can be lined with boughs of trees in addition to whatever other cushioning material can be obtained.

The normally simple project of placing out aiming stakes will vary in complexity with the depth of the snow. If there is too little snow, stakes cannot be placed in the frozen ground, and they may have to be frozen into #10 cans to obtain a firm base. If the snow is deep, and if a hole has to be dug in it to seat the mortar, trenches may have to be dug to see the aiming stakes because of the low level of the sight.

The use of the aiming circle or compass to lay mortars on the proper azimuth is difficult because of the declination constants encountered. In the Thule region, an angle of 70° exists, and angles of this nature are normal during operations in the Arctic region. It is interesting to compare this with an angle of 23° in the State of Washington, the greatest angle encountered within the Continental United States.

THE Fire Direction Center will normally work from inside a vehicle or tent, thus encountering relatively few difficulties. Because man becomes a cumbersome creature in Arctic clothing, use of the M-16 Plotting Board is recommended over the Grid Firing Chart with the Range Deflection Fan, there being less likelihood of losing small pieces of equipment. However, the plastic board will tend to become brittle at low temperatures, and care must be taken to prevent it from shattering.

The need to wear Arctic mittens will also cause difficulty. Tasks performed simply barehanded become extremely complicated with the bulky mittens. In firing the mortar, for example, troops often encounter dangerous hang-fires when their mittens become jammed between the muzzle of the weapon and the round of ammunition. The mittens are necessary, however, for without them troops rapidly become frostbitten, or find their bare flesh freezing to metal objects.

In actual firing, ammunition will present most of the problems. At temperatures below zero, the sheet charges on all 4.2 ammunition have a tendency to freeze and become brittle. These charges come in three types of bundles: five-charge, one-charge, and one-half charge. The one-half charge sheets, and sometimes the one-charge sheets, shatter while being fixed to the base of the round. The striker-nut at the base of the cartridge container extension and the cartridge container extension also freeze together, and it is sometimes impossible to separate them.

The Infantry School teaches that, in 4.2 mortar gunnery, a constant barrel elevation should be maintained, and charges should be adjusted to vary the range. However, because charges shatter when being handled by the crew, this technique ranges from difficult to impossible at sub-zero temperatures. Tabular Firing Tables instead of Graphical Firing Tables (GFT) should be used, and a nearest whole charge selected, with fire adjusted onto the target by varying the elevation.

Some mortar units in Alaska still use the GFT but use another method of adjusting fire which presents a greater safety problem. They remove the charges from the rounds and place them in a container within a warming tent, causing them to become pliable. The desired charge is announced, and the rear of the round is placed through the door of the tent, where the correct charge is placed on the cartridge container or its extension.

Either method can be used, but a burning tent is the most feared accident in the Arctic. Placing highly flammable charges in a tent near the open flame of a Yukon stove is tempting fate. For this reason, the safer Tabular Firing Table method is recommended.

Because of the difficulty in adjusting charges on the round, an excellent solution is to prepare rounds beforehand, with proper charges for firing various concentrations and barrages.

Firing the 4.2 mortar in sub-zero temperatures can become discouraging, and its use as a close support weapon is limited because of the great dispersion of the rounds when landing. A partial cause for the dispersion is the varying rate of burning of the propellant at low temperatures. The greatest cause of dispersion, however, is the poorly seated baseplate which shifts with the firing of each round.

Some people feel that a lighter mortar with lighter ammunition is a solution to the problems of firing in low temperatures and in

snow-country. However, lighter mortar rounds, and sometimes even the 4.2-inch mortar rounds, will land in deep snow and fail to explode because of the cushioned impact. In addition, snow has a muffling effect on the bursting radius of the round, causing a considerable reduction in its killing potential. The use of VT fuses with the 4.2 mortar will solve most of these problems, because they can be adjusted to burst at the desired height above the ground.

The organic transportation of the Heavy Mortar Platoon is roadbound in snow country, thus limiting its use. If 200-pound sleds are used to move a platoon, it would take approximately twenty men, with four or five sleds, to move one mortar and a squad's equipment. Ammunition resupply would also present major problems, because a sled can carry only a few rounds. One of the better means of transportation would be a snow tractor with two one-ton sleds towed in tandem. The platoon's equipment would be easily transported, including a generous supply of ammunition. Members of the platoon would then have to travel cross-country on snowshoes.

The 4.2-inch, full-tracked, self-propelled mortar M84 is a heavy mortar-carrying version of the M59 armored personnel carrier. This carrier permits the weapon to be fired from inside the passenger compartment, and precludes many of the back-breaking tasks encountered when emplacing a mortar. The APC is considered the best vehicle in northern operations for combat troops because it can transport a full squad and its equipment, as well as provide heat, shelter, and protection against nuclear radiation. A heavy mortar-carrying version of the air-transportable M113 APC is being tested now, and is expected to be adopted in the near future.

UNTIL our Army is more completely mechanized, the use of the 4.2-inch mortar will continue to tax the strength and endurance of even the best-trained units. In northern operations, the problems are even greater. The heavy mortar is too valuable a weapon to abandon, however. It is imperative, therefore, that we do everything possible to make its use simpler and more effective. In northern operations, careful attention to the practices outlined in this article will aid greatly in achieving easier and more effective employment of this useful weapon.

ILLUMINATION WITH THE 4.2

Capt William C. Torbett III, Inf

INFANTRY FORUM

MY experience with the 4.2 inch mortar leads me to feel that the method of determining firing data for illumination missions must be improved. This can be accomplished by a table, prepared by the mortar FDC, which will enable the FDC to shoot effective, timely illumination whenever it is needed.

The graph evolves from a relationship between the change in a round's charge and fuze setting, and the resultant change in range. Figure 1 shows the need for charge and fuze settings to vary with range. True, a 4.2 *can* place illumination in the vicinity of a target by changing only one of the two variable elements. However, accuracy is sacrificed for speed with this method. For accurate fire, both elements must be considered.

The forward observer, in adjusting illumination rounds, must correct for range, deviation, and height of burst (correct height is 700-800 yards).

The Fire Direction computer will be busy if he tries using only the firing table data furnished by FT 4.2-1 (C-1). After determining proper deflection and range from the firing chart, he must refer to FT 4.2-1 to determine the correct charge and fuze setting.

The chart reproduced in Figure 2 is part of a graph derived from Firing Table 4.2-1 (C-1), and is made in the following manner:

(1) Starting at the lower left corner of the graph, the charge is plotted vertically from charge 4 to charge 28.

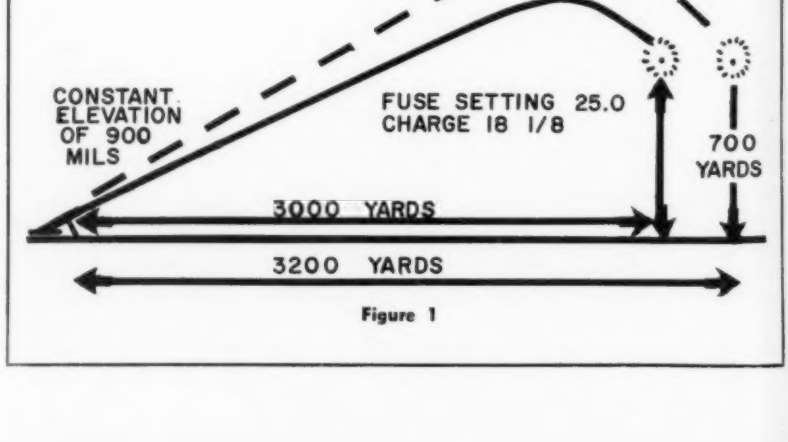


Figure 1

(2) From the same starting point, the fuze setting is plotted horizontally in seconds from 0 to 34.

(3) From the Firing Table, the charge and fuze setting required for ranges 800-4200 yards, in increments of 100 yards, are determined. These are plotted and connected on the graph, giving a curve which I call the *0 Height of Burst* Line.

(4) For each 100-yard increment of range, a correction of UP 300 and DOWN 300 is determined from the table and plotted on the chart. This gives a series of points which, when connected, form two lines approximately parallel to the 0 Height of Burst line, one above and one below. By connecting the points which are above the 0 line, the UP 300 Height of Burst line is established. The points below the 0 line give the DOWN 300 Height of Burst line.

(5) You have now established three points for each 100 yards range, one on the 0 line, one on the UP 300 line, and one on the DOWN 300 line. Connect and label these three points.

(6) Determine from the firing table where, on each range line (constructed above), the intermediate height of burst corrections will fall and construct on the chart the other ten height of burst lines (UP 50, UP 100, UP 150, UP 200, UP 250, DOWN 50, DOWN 100, DOWN 150, DOWN 200, DOWN 250). Up to range 1500 yards the chart is more difficult to construct, because (with the shell burst on the upward leg of the trajectory) it is impossible to raise the height of burst without changing the elevation of the mortar.

(7) After mounting the chart under acetate it is ready for use.

Due to space limitations the entire chart has not been reproduced; however, by using the portion shown below and the instructions included above, no problems should be encountered in constructing the entire chart. A short example will show the method of using the chart.

Based upon the forward observer's initial fire request, the computer determines that the first round is to be fired at a range of 3000 yards. On the chart, where the 3000 yd. range line crosses the 0 height of burst line, the computer reads straight down to find a fuze setting of 25.0 seconds, and straight across to find the correct charge of 18⅛.

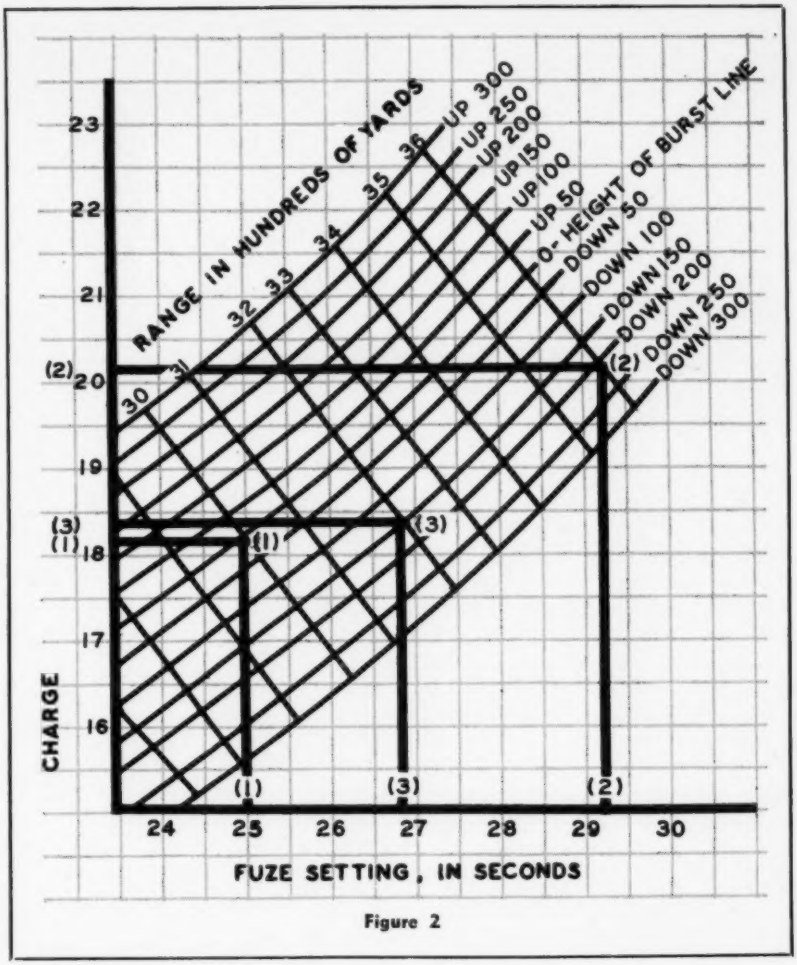


Figure 2

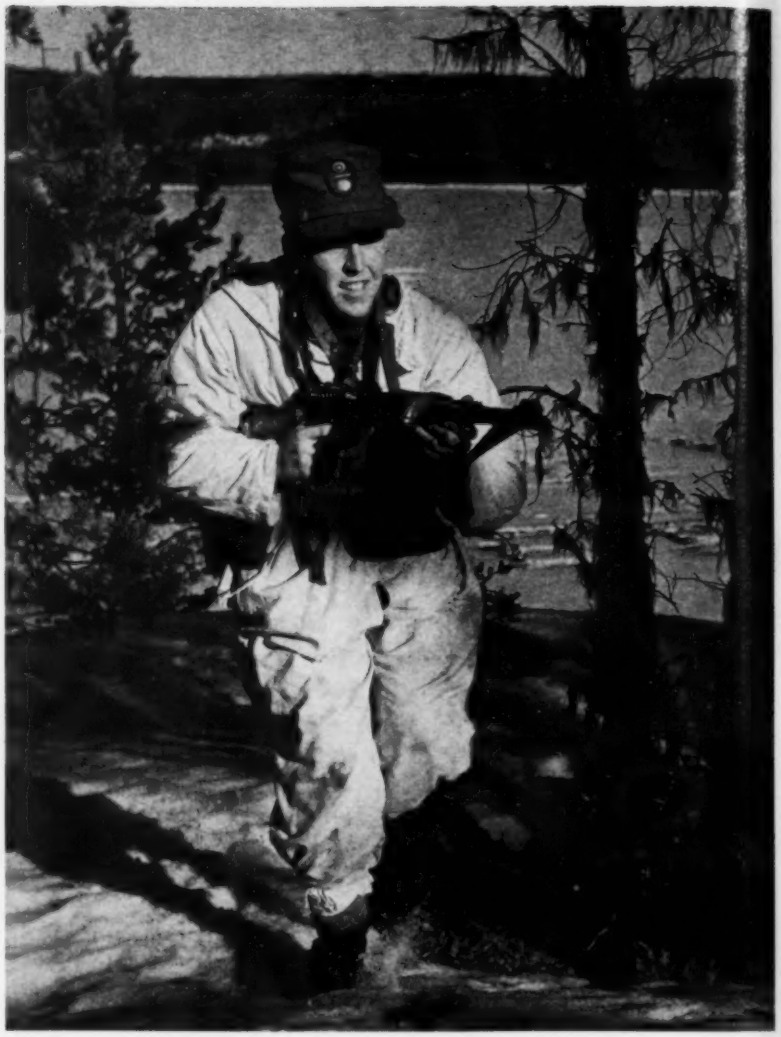
The subsequent correction from the forward observer, when plotted, yields a mortar-target range of 3600 yards, and includes a height of burst correction of DOWN 200. The computer locates the intersection of the 3600 yard range line and the DOWN 200 height of burst line. From there he reads the correct fuze setting of 29.2 seconds and a charge of 20 2/8. To assist in the determination of subsequent data, it is useful to put a grease pencil mark at this point.

The next correction from the observer contains the element "UP 50" and deviation and range corrections which result in a mortar-target range of 3200 yards. The computer need only go from his grease pencil mark up to the next height of burst line, which is the DOWN 150 line, since he knows they are 50 yards apart, and follow it until he crosses the 3200 yard range line. From that point he determines the fuze setting to be 26.8 seconds and the charge to be 18⅜.

While two of these charts are required, one for firing with the cartridge extension and one without, the time required in preparation is well spent, for it enables a unit to deliver accurate illumination over targets much faster. And for the Infantryman who required the illumination, the seconds saved may make a lifetime of difference!

The Swedish Infantry

Contributed by
Gunnar Ruud
Tekno-Press Ab, Stockholm, Sweden



Sweden's military defense is based on National Service, whereby fit males between the ages of 18 and 47 are liable to serve in the armed forces. Army soldiers are given basic training for about 10 months, and at certain intervals undergo recapitulatory exercises. In case of need, the Army can be placed on war-footing in a few days. Regular officers, commissioned and non-commissioned, are comparatively few and occupy key-posts in the event of war. The majority of officers and NCOs are Volunteer and National Service officers.

Infantry, armoured infantry, and armoured forces are the main services of the Army and form the main body of the Swedish brigades.

The Swedish infantry is in a stage of intensive development. Certain basic factors which influence the Swedish infantry should be mentioned. These are Sweden's position as a border state between West and East, its non-alliance policy, Swedish landscape and the climate, the Swede's good soldiering qualities, the limited supply of men, and her economic resources.

Owing to her geographical position, Sweden keeps her war-preparedness on a high level. Wide areas and long frontiers, all difficult to survey, require considerable forces for guard duty and protection. Thus, the infantry must be easily transportable, and must be able to organize a great number of detached units.

The Swedish Infantry is organized, equipped, and trained for operations in Swedish climate and on Swedish soil. Sweden covers a length of about 1000 miles, with climate and topography in the north considerably different from that of the south. There are large open spaces as well as vast forests. The country spans from continental plains in the south to arctic tundra and alpine landscape north of the Arctic circle.

For economic reasons, it has proved necessary to use to the greatest possible extent the non-military resources of the Swedish community for equipping field units at mobilization. The infantry's transportation, thus, has been adapted to the national supply of tractors, cars, and bicycles. There are, of course, Army vehicles for special tasks.

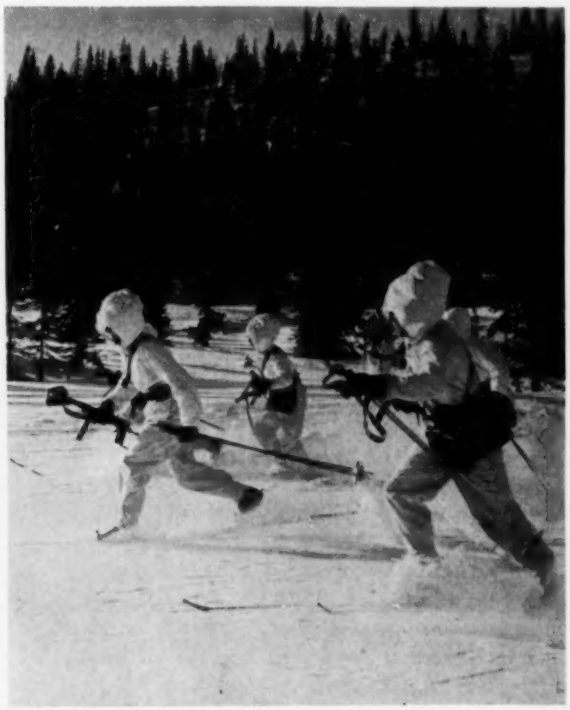
The fighting of Swedish infantry aims at rapid attack and conquest by surprise from dispersed groupings. Positions used are such that the enemy cannot efficiently use nuclear weapons, tanks, artillery,

The Swedish Infantry is armed with the most modern weapons, including the FN (Belgian) light machinegun (left), and the easy-to-handle 9 cm. antitank gun (right).

or air force. The endeavor is high mobility coupled with surprise attack in covered ground difficult to traverse in darkness, in severe weather conditions, or in deep snow.

All over the world firepower, mobility, and cover are the serious infantry problems. Circumstances in Sweden render impossible the total standardization of infantry unit organization. What is suitable in the comparatively open country and mild climate in south Sweden is not equally suitable in the country around the Arctic circle. Infantry liable for service in southern Sweden will be equipped with armoured caterpillar cars, whereas mobility in northern Sweden demands vehicles operating on snow surfaces.

The demand for firepower is the same irrespective of the country. Each company is equipped with high-quality, short-range antitank weapons (grenade rifles), and with antitank rockets and mines. These weapons are effective against all modern tanks and can be used to fire high explosives against troops. The company has a reserve of antitank weapons, and there will be a



Each man is a fighting unit, with all necessary equipment packed into a special rucksack or other containers strapped to him: rations, spirit stove, ammunition, wound dressing, etc.

reserve at battalion and brigade.

Each combat battalion is equipped with weapons for indirect heavy fire. In the future those weapons will become still heavier, and will be given increasing firing range.

Combat platoons are equipped with light submachineguns. All weapons to be carried in battle weigh less than 15 kg (33 lbs). Each weapon has been tested in the full range of Swedish climate.

In ground combat, units must be re-groupable over vast areas of roadless country. Because of available resources — primarily economic considerations—road mobility of infantry units is based on bicycles and standard motor vehicles. In roadless country, mobility is based on tractor-drawn vehicles, horse-drawn vehicles, or pack horses. Bicycles and horses, organized in special auxiliary units, are attached to infantry battalions when necessary. Practically no kind of terrain is regarded as impassable. Where a foot soldier can press forward, an infantry battalion can push on and keep up good fighting ability. In winter, in snow three feet deep or more, there are also auxiliary units of caterpillar vehicles ("Ferrets") and snow ploughs. All combat soldiers are then equipped with skis, rendering the units very mobile and fast in winter.

Naturally, climatic conditions influence equipment of both the individual soldier and the unit. Continuous research is made to improve this equipment to make the soldier as independent of the climate as possible. Every unit also has tents with stoves so that all men can be quartered.

The need of good, nutritious food is met by a special field kitchen for each company. Moreover, each soldier has reserve rations and a small spirit stove. Battalion always has enough provisions to function for several days without fresh supplies.

Armoured caterpillar wheel cars enable Infantry units to press on after tanks have cleared the way.

Medical attendance is adequately provided for. Every man carries first-aid requisites and has been trained to dress wounds. Men trained in taking care of the wounded make up part of every platoon. Moreover, the company has medical orderlies and ambulance men, and in the battalion there are two surgeons with the requisite staff and medical appliances for minor surgical operations, for the transportation of the wounded, etc.

There is constant work going on to keep the organization, equipment and training of Swedish infantry units on a high modern level. The aim is for every company to be capable of independent action in battle.

The advance of ski troops is almost noiseless.

HEADQUARTERS, U.S. MILITARY ADVISORY GROUP

Capital City, Scraglandia

5 November, 1961

Dear Charlie:

Sorry I haven't answered your last letter, but things have really been moving here. You know I was assigned to Scraglandia Military Advisory Group when I left the States, and we laughed that we had never even heard of Scraglandia. Well, since being in SCRAGMAG I found out why. Scraglandia once was both rich and powerful, but it has had a series of nasty breaks. Specifically, it has lost every war for the past 200 years. After paying its reparations and making territorial concessions, there really isn't much left.

Our primary job is to find out why the Scrags lose so often. The people are bright, healthy, and well educated. The Army is full of dedicated professional officers, and the Scrag Army service schools produce wonderful staff officers. They are so smooth that there has been talk of farming the officer corps out into the staffs of various NATO armies, and totally eliminating the Scrag Army. Naturally, the Scrags are resisting this, and we are trying to help them.

Two months ago the Scrags formed a new division. I was assigned to follow the activities of a Captain Solon and to see if any basic errors were being committed. Solon is a good, solid, likable man, a graduate of the basic and advanced Infantry courses, and a veteran of the Retreat From The Lowlands campaign. The organization of the new outfit was a real masterpiece. Every barracks at Camp Panik was clean, bunks made up, utilities on, equipment in the supply rooms, and operating vehicles in motor pools. Post caretaking people were standing by to turn over property, furnish transportation, and make themselves useful in general.

Major General Starz arrived at 0800 with his staff. Other officers and key NCOs arrived by noon. While the NCOs prepared to receive the recruits in the afternoon, all officers ate at the club, and then went to the theatre at 1300 for a briefing by General Starz.

Starz is a good man, a veteran of the Western Withdrawal Campaign and the Retreat from the Mountain Region. His comments were brief and to the point. He said, "I want sharp, intelligent, soldiers, good marksmen, in good physical shape. Men who can fight as an integrated part of a platoon. You give me good platoons, and I'll give you a good Army!"

General Starz was followed by his staff. The G-1 said he would like every man to get 30 days leave a year, with a maximum effort at Christmas time. He stated he would monitor the intelligence level of the soldiers in keeping with the General's remarks.

The G-2 spoke briefly of adequate security. He primarily wanted an adequate military guard around the camp.

The G-3 stated he would concern himself with marksmanship, physical proficiency, and small unit tactics. The G-4 pushed maintenance.

The officers in the audience were attentive and in complete accord with everything said. Captain Solon and I returned to barracks to supervise the new troops' getting fed and bedded down. After supper, while checking property in the supply room—which, incidentally, checked perfectly—I talked to Solon on his concept of training.

"Don," he said, "these boys look good. Tomorrow morning they start on PT and dismounted drill, and a short hike. In the afternoon they learn how to take care of their weapons until about 1500. Then they get a little bit of sports and games. I plan to increase the lengths of the hikes every other morning, and alternate with marksmanship training. Good basic PRI is the answer to getting everyone qualified. After qualifying on basic weapons, they'll familiarize on other weapons. I'll ease up on the hiking and start simple

squad tactical training in the second month. During that same time the other company commanders and I will expand the sports and games into softball or volleyball intra-battalion competition. Company spirit, you know."

"Sounds good," I said. "Who's going to instruct?"

"Well," mused Solon, "I have three platoon leaders and an executive officer to train my hundred-man company. Lt Eager, the exec, will watch administration so I can watch training. Lt Point runs the marksmanship program, Lt College has the PT and DD, and Lt Ranks, who has most experience, supervises squad tactical problems. When we go to platoon problems, each gets his platoon and a free hand."

"What about make-up training?" I asked.

"I figure the G-1 will want four men on leave at all times. Three on guard and three on KP will keep me at about ninety per cent present - for - training strength. We'll conduct make-up training as required, but my program is so basic that a lot of make-up is unnecessary. You can't really make up maintenance or hiking, you know. Incidentally, while the afternoon intramural athletics may be interrupted for an occasional parade, the afternoon maintenance will be pretty firm. I'm with the G-4 all the way on that."

Well, Charlie, Captain Solon looked like he knew what he wanted, so I hit the sack ready to see what developed in the morning. By first light there was eighty-nine per cent of the company present for duty. Besides the ones on leave, guard, and KP, there was one on sick call. But by 0800 the picture had changed radically.

Two college-type recruits went to the education center to set up off-duty schooling. Lt Point and two sergeants went to the Division NCO Academy. One sergeant and two bright recruits also went as students. Seven soldiers were assigned to various regimental and division athletic teams, along with Lt College, who became Regimental A&R officer. About the same number went on various marksmanship teams—all the way to Army—and Lt Ranks went along as a coach on one team.

Solon complained to his battalion CO that he couldn't conduct decent training with less than half a company. The Division G-3 promptly got the message and published elaborate instructions on how to keep track of who needed make-up training, to include charts and individual records. The instructions were so complex that Captain Solon had to assign an NCO and a recruit as Training Sergeant and Training Clerk. He then tried to explain that with no platoon leaders and only half his NCOs, the quality of instruction would fall off. After all, one NCO can teach only so many subjects well on any given day. All this got Solon was an increase in his quota to the NCO Academy.

By nightfall, the company present-for-training strength had stabilized at 40%. Unfortunately, the equipment strength stayed at 100% and the G-4 scheduled an inspection for the end of the week. Well, I'll say this for the Captain, he kept in there pitching.

Solon, Eager, and the key NCOs gave up all thought of taking leave. By having the NCOs do some of the recruits' work, by cutting out PRI and company-level athletics, and by working nights, the equipment passed inspection.

Unfortunately, the troops did not pass their rifle marksmanship so well. The best potential marksmen were all on TDY to the higher level teams. However, during their make-up firing—which they took on Sunday afternoon without benefit of further PRI—even the bolos passed. The troops had discovered the M-1 pencil.

Charlie, that 100% maintenance with 40% present for duty stayed with us all through training. Guard and KP came up all the time for the 40% who stayed in the company. Small unit training at less than half strength, with the leaders missing, was a real joke.

I talked to Solon in the Officers' Club last night. He was tired and a little crocked,

or he probably wouldn't have been so frank.

"Don," he said, "This being a forty per cent commander is for the birds. Everyone is working weekends and nights just trying to keep up with the maintenance. Leaves are tight for all the NCO's, and I flatly cannot afford to give passes. Lots of the better men want out of the rat race. My athletic, marksmanship, and small unit training programs have all fallen through. No one can use the education center off-duty because there is no off-duty time.

"Today was sort of a bad day, in a typical sort of way. One of my young troops on the Corps BAR Marksmanship Team got drunk last weekend and I was chewed out for it. I can't even remember what the kid looks like, he's been gone for so long. The NCO Academy rejected the last man I sent because he couldn't meet the educational requirements. The G-1 said that division records indicated I had eight college types who would have been better choices. I told him I'd love to send them, but all eight were smart enough to work a special duty assignment where I couldn't touch them. I feel that I'm not really running the company at all—at least, I'm not running sixty per cent of it."

"How do the other people in the division feel?" I asked.

"Well, the division staff is busy and thinks we are all training like crazy getting the mission done. All the company commanders worth their salt have their young troopers believing they are real first-rate soldiers. But the commanders, junior officers, and key NCOs all know better. You ought to visit a tank company and watch crew training with two men per tank. It really discourages the young tank platoon leaders."

"Speaking of being discouraged," I said, "What's the story on Lt Eager's resigning?"

"Don't talk to me on that, please," moaned Solon. "Like I said, you can fool the staffs and the recruits, but not the junior officers. Eager wants to be part of a good outfit and accomplish something for the work he expends. I can't talk him out of it. I wish I could because I spent two hours at division headquarters being chewed out for lack of leadership when Eager submitted his resignation."

Charlie, I tried to point out that he was getting some training done with the men still left, but that didn't seem to perk him up much.

"Listen," he said. "There are some men in this company that can shoot one type of weapon. There are some that can pull maintenance. There are some in good physical shape. There are some that are bright and alert. But there are none that are all of these things, and part of a well-trained platoon to boot. In effect, the marksmanship, education, schooling, and athletic programs from higher headquarters have left my soldiers a rabble of uneducated, non-athletic, disorganized bolos.

"All I want is sharp, intelligent, soldiers, good marksmen, in good physical shape. Men who can take care of themselves and their equipment. Men who can fight as an integrated part of a platoon."

His last sentence took me back to that first meeting in the theatre. It seems like years, but that was only a few months ago. General Starz and Captain Solon both seem to have the same objective. Neither seems to be able to reach it.

Charlie, if you can think of anything to help, let me know. These Scrags are a grand bunch taken individually, and I want to help them all I can. The problem might have something to do with the present-for-training strength. Or maybe training is over-centralized. I don't know how to lick the problem, but I sure know it exists. How about checking a couple of United States Army outfits for me and let me know how they handle it.

Regards to Linda and the kids, Charlie. Congratulations on that new staff job.

Sincerely,

Don

Ice Mining—Army Style

Capt Frederick C. DeLisle, Inf

ON THE morning of 30 November 1939, the Soviet Union launched an unexpected land, sea, and air attack against Finland. Highly mobile Russian units advanced rapidly across sparsely held borders. Soviet tank units were given the "green light." They attacked with awesome strength, but after disappearing into the forests of Finland, many of these units were never heard from again. Why? Because the skillful Finns had bottled up these road-bound units with landmines and natural obstacles. Before the end of this short and bloody conflict, 250,000 Russian soldiers were buried in the bitter cold snow of Finland. Even though the Finns could not have hoped to win a war against Russia, they did impress the world with their skill in cold weather operations.

Finland's successes were brought about through an understanding of the terrain over which the conflict was fought. Tactics and weapons may change, but terrain and weather conditions are relatively constant. To capitalize on their rugged terrain, the Finns skillfully employed landmines. They truly understood the use of mines in conjunction with the terrain.

Northern areas usually don't have many good roads. Our own State of Alaska and the entire Yukon Territory of Canada are serviced by one main supply route which provides only limited two-way traffic. In Siberia, circular pieces of wood are cut and fitted together much like the old Roman roads. Secondary supply routes consist of frozen lakes and rivers or trails bulldozed through the wilderness. During World War II, the German Army supplied forces at Leningrad over ice roads, and even placed a railroad over deeply frozen Lake Lodoga. Russian tank units in Finland used the frozen lakes and rivers as avenues of approach.

Militarily, the terrain of countries in northern latitudes presents one series of obstacles after another, including thick forests, dense underbrush, swamps, and numerous lakes and rivers. Furthermore, some of these features may be obstacles in the summer and avenues of approach in the winter. It is these obstacles, properly used, that give a decided advantage to those who first master them. To further insure the effectiveness of these obstacles, gaps between them must be closed by still another obstacle —landmines, both standard and improvised.

The current family of landmines provides the Infantryman with a wide variety of ready-made explosives and fuzes. During summer operations in northern latitudes, these mines may be employed as they would be any place. However, during cold weather, with its deep snow or conditions of quick thaws and sudden freezes, special precautions should be taken. Low temperatures will have little or no effect on the explosive power of mines, but mines with frozen pressure plates or frozen fuzes, and mines buried too deeply under the snow, will not function. Therefore, it is essential that everyone employing mines have a thorough knowledge of their functioning and the methods of employment.

Old models of antipersonnel and antitank mines (M2, M6, M7, and M15) are not weatherproof. They must be wrapped in cloth or other material to prevent ice and blowing snow from clogging the fuze wells. When the M6 and M15 antitank mines are used, the arming dials should be coated with automobile grease or GI soap to make them waterproof. After being treated in this manner, they need not be placed in a container, for they will be weatherproof and quite reliable. Newer antitank and antipersonnel mines (M14, M16, M19, and M21) are completely weatherproof and may be used as issued.

Except for the M21 "tank killer mine," all of our antitank mines are pressure-operated. If these mines are buried too deeply under the snow, or if an ice bridge is allowed to form over them, there will be insufficient pressure from even the heaviest vehicle to detonate them. Loose snow, two to four inches deep, must be scooped off, and the mine placed on top of frozen ground. Replacing some snow over the mine serves to camouflage the minefield. Mines placed in deeper snow must be supported. This can easily be accomplished by placing under the mine two crossed beams or logs of equal dimensions. Only pull-type fuzes should be used to equip antitank mines with antilift devices. Other fuzes may freeze or become clogged with snow and ice, thereby making them unreliable. Trip wires should be kept high and left loose, for taut trip wires or wires placed on top of the snow are more easily detected and will give away minefield locations. Mines should be painted white for better camouflage.

Not all minefields need be employed in the standard patterns shown in FM 20-32. There are also provisions in the FM for scattering

mines and for placing mines on top of the ground. These variations are sometimes necessitated by the limited number of mines carried in the Battle Group's basic load of ammunition. Furthermore, some special operations, such as ski-trail mining, do not lend themselves to the standard-pattern minefield.

A well trained unit operating in the north establishes perimeter ski trails for local security at night (see "Subarctic Bivouac," this issue). A silent ski patrol can slip in and place mines on or along these ski trails. Trails going to and from the various headquarters are also vulnerable to this type of mining. Either the M16 bounding antipersonnel fragmentation mine or the M14 plastic antipersonnel blast mine may be used. Placed on the side of the trail and detonated by a trip wire across the trail, the M16 can have a devastating effect on a unit. If the M14 is used, it should be placed on the ski trail with the pressure plate slightly above the hard-packed surface of the ski trail. One word of caution—this is nuisance mining and requires the authority of the Army Commander. If, however, the M18 antipersonnel weapon (Claymore) is used (manually fired), no authority or records are required. (See "Ambush By Claymore," *Infantry*, Jan. '61.)

A TYPE OF mining peculiar to cold weather operations is ice mining. Ice mines were used effectively by the Finnish Army to stop the Russians by creating obstacles of the frozen lakes and rivers which the Russians had hoped to use as avenues of approach. The Finnish ice mine has a thick glass body, resembling a quart milk bottle, and is filled with about four pounds of explosives. It was used so successfully by the Finns that the Germans adopted it without any changes. We have no ice mines as such, but they may easily be constructed.

In an ice mine, the explosive charge consists of TNT or Composition "C." Each charge may be wired to an electric blasting cap or to the concussion detonator M1. The best results are achieved through a combination of the two (Figure 1). The size of the charge depends upon the thickness of the ice:

Thickness of Ice	Distance Between Holes	Size of Charge
Less than 2 ft.	12-15 ft.	8-10 lbs TNT
2-3 ft.	10 ft.	10-15 lbs TNT

The charges are tied together to form a compact bundle, or are placed in a sandbag, so that more than one method of detonation may be used. (Experience has shown both the electric blasting cap and detonating cord to be somewhat unreliable under water.) Then a hole is bored or cut in the ice. The charges should be suspended at least two feet beneath the undersurface of the ice. This is accomplished by hanging the bundle from a rope or wire attached to a stick placed across the hole in the ice. Two alternating rows of charges, 100 to 300 yards long and 20 feet apart, compose a minefield which will blow a 40 to 60-foot gap in the ice.

Ice minefields may be employed in a number of ways. Perhaps the most devastating effect is achieved by placing one field as close as possible to the enemy shore, with another located close to the friendly shore. The enemy is allowed to advance past the first field, and then both fields are detonated simultaneously. The enemy then finds himself marooned on an ice floe, unable to go forward or to retreat. This type of obstacle does require considerable advance preparation, and it must be constructed before security elements are withdrawn. Once constructed, however, it is extremely effective and seems well worth the trouble.

In northern operations, mines are important weapons which can be used to close gaps between natural obstacles, to harass enemy lines of communication, and to cause panic and fear among enemy troops. Mines enable us to use the peculiarities of the far north to our advantage, turning avenues of approach into obstacles. But let us make certain — through training and preparation — that when the sound of exploding mines shatters the silence of the northern wilderness, it is we who are standing on the shore and the enemy who is marooned on the ice floe.

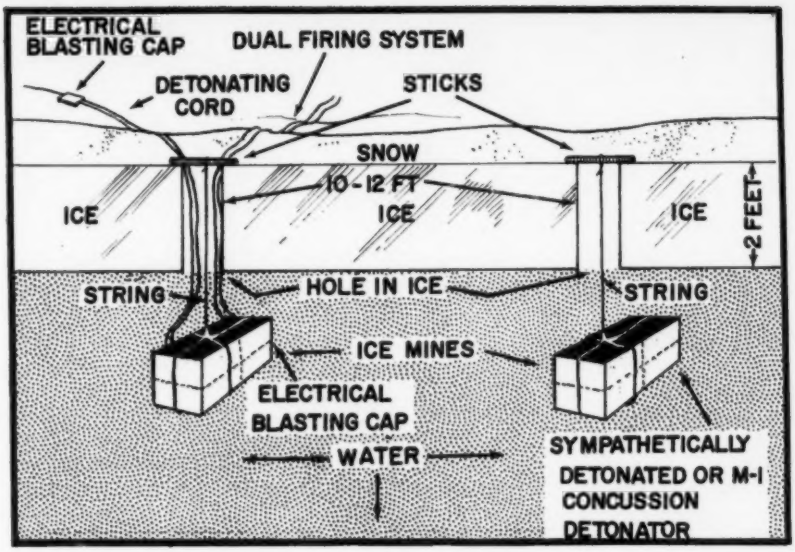


Figure 1

THE INFANTRY BOARD

At Fort Benning, Georgia, a unit composed of highly skilled military technicians works under a strict veil of security to provide the U. S. Infantryman with equipment which will assure that he is the best equipped soldier in the world. That is the mission of the United States Army Infantry Board, a little-known but important agency of the Continental Army Command.

Established in 1919, the board has as its purpose the study of constantly changing equipment problems and technological needs of the Infantry. It was an outgrowth of an earlier "Infantry Board" established in 1903 at the General Service and Staff College at Fort Leavenworth, Kansas, with a total membership of three field grade officers of Infantry and two senior Captains stationed at the College. These officers were "to have referred to them from time to time, subjects relating to the operation and equipment of the Infantry Arm upon which their opinion might be desired." This Board ceased to function, however, when the 13th Infantry left Fort Leavenworth for the Mexican Border in 1911.

Then, testing of Infantry equipment was carried on at the old School of Musketry at the Presidio of Monterey, largely on its own initiative, until in 1919 when the current Infantry Board was established as a developmental and testing laboratory with a permanent location at Fort Benning, Ga. In the years that followed, the name of the Board was changed several times, the latest occurring when CONARC General Orders redesignated it as the United States Army Infantry Board in 1957.

As a developmental and testing agency, The Infantry Board plays an important role in assisting the vast American industrial complex in supplying military equipment. It provides the civilian technician and engineer with an explanation of the military characteristics of the type of equipment that is wanted, provides guidance during its development and production, and, finally, determines whether the end result is suitable for use by the Army.

As a link between the user, the Infantryman, and the developing agency, the Board is the Infantryman's representative in research and development. Its combat-trained officers and non-commissioned officers present the soldier's point of view during the development of new materiel.

Currently, there are 189 enlisted men and 39 officers assigned to the Board. These men concern themselves with everything the soldier shoots, wears, uses or eats—both in garrison and in combat. They must strive to provide him with better arms, lighter loads, greater speed and mobility—in short, with those things which will help him to win any battle he may fight. This mission requires highly skilled, well-qualified personnel. As a result, from the standpoint of military experience and academic achievement, personnel assigned to the Board can be considered representative of the Army's best. Most officers have had combat experience in the areas with which they are concerned, and are thoroughly familiar with all facets of the materiel they test. Enlisted personnel are selected after careful screening for their assignment. Many are college graduates and some hold post-graduate degrees.

To accomplish its development and test missions, the Board is divided into four test departments: The Small Arms Department; the Mortar and Surveillance Department; the Rocket and Recoilless Department; and the Field Equipment and Special Projects Department. The Director of each of these departments is directly responsible to the President of the Board for all correspondence, equipment, plans of tests, conduct of tests and reports of projects that pertain to his department.

The Small Arms Department is responsible for all shoulder-fired weapons (except rocket and recoilless), machine-guns, infrared direct fire sights for these weapons, grenades (except antitank), hand-held signals, and ammunition, accessories, training aids, and related maintenance items.

The Mortar and Surveillance Department participates in the development and conducts service tests on all Infantry mortars and high angle trajectory weapons, munitions, fire control equipment, battlefield surveillance equipment, mounts and related items.

Rockets, recoilless and antitank weapons, antitank grenades, special antipersonnel weapons and flat trajectory weapons other than those assigned to the Small Arms Department, come under the zone of responsibility of the Rocket and Recoilless Department.

The Field Equipment and Special Projects Department is concerned with equipment and protective devices for the individual and small unit, and with individual rations, field messing facilities, chemical weapons and munitions, tentage

The Infantry Board makes extensive tests on items of equipment before they are adopted for Army-wide use.

and miscellaneous equipment for the individual and small units.

Most of the Board's equipment tests occur at Sandy Patch, a restricted area surrounded by a 6-foot cyclone fence topped with barbed wire and guarded 24 hours a day. There, test items can be subjected to all weather conditions found in a temperate climate. A climatic chamber can freeze them to 40 degrees below zero or bake them at 150 degrees above. There, too, test equipment can be evaluated under artificially produced weather conditions ranging from torrential tropical rain to the swirling dust of a midwestern tornado. On the test ranges also, project officers strive to simulate every conceivable battlefield condition in evaluating any given item. If sufficient facilities are not available for a proper analysis, they are constructed.

A good example of Infantry Board testing was the recent trial of the M72 LAW. Before the weapon was recommended for adoption as standard type, it was tested to determine the accuracy and flight characteristics of the projectile, the probability of a first-round hit, and its destructive effect against armor plate as well as concrete, log, and sandbag emplacements. It was exposed to extremes of heat and cold, and to dust and rain to observe and record any possible adverse effects. The effect of flash and blast were noted. Maximum and minimum ranges were established. Members of the Board parachuted out of aircraft with it, carried it on forced marches through swamps, dense foliage and rugged terrain to determine its durability and mobility. Time required for the average soldier to be trained with the weapon was recorded to determine training requirements. The list of tests for this particular item goes on and on —each test designed to determine a definite fact or answer a specific question. All unknowns about an item become known before a conclusion is reached about the value of the item to the Infantryman, and before the decision to recommend rejection or acceptance is made.

Today's soldier must be prepared to fight anywhere in the world under any conceivable conditions. It is the job of the Infantry Board to see that his weapons and equipment are second to none as it strives to accomplish its mission of providing, "Only the Best for the Finest."

Infantry *thanks Captain Joseph M. Krisewicz. Test Officer of the Rockets and Recoilless Section, Infantry Board, for contributing the information which formed the basis for this article.*

The Mule is Back

In our July-August issue, Captain Woodall made a plea for returning the mule to our Army. Perhaps this was partly tongue-in-cheek, but we promptly heard from Company B, 11th Special Forces Group (A/B), at Camp Kilmer.

It seems that this unit, during its summer training, managed to find three prime ingredients at the same time and place. First, there was an interested, would-be muleskinner. Next, there was a time-worn copy of FM 25-7, vintage 1944. Last, there were three mules considerately lent by a kind citizen of the parts.

It is reported that the company had a whing-ding of a time, but that they really learned something about mules. Apparently the *vice* was also *versa*. At last word they were doing splendidly, despite the shenanigans which only a mule can carry off with relative impunity.

Subarctic Bivouac

Capt Robert E. Wharrie, Inf

As you stride along near the head of the column, your skis make that squeaking sound in the snow, indicating that the temperature must be down around twenty degrees below zero. During the last ten-minute break, you checked the men in your platoon for frostbite. No white spots on their faces or fingers, and they said that their toes felt all right. They all looked pretty tired, though, and it is no small wonder since they have been moving in three or four feet of snow for almost ten hours. Your platoon's mission is to break trail and provide forward security for the company in a move to an assembly area 15 kilometers from the present camp, in preparation for an attack. The main body will follow your trail, and should catch up with you early tomorrow.

When you arrive at the creek, landmark for the assembly area, you have only one hour of daylight remaining in which to set up bivouac. The trail-breaking squad, which was a few minutes ahead of the rest of the platoon, has reconnoitered along the creek, and the squad leader recommends a bivouac site where the creek bends around in a loop. You notice that although the creek is only twenty feet wide, the banks are vertical and almost six feet high, forming a good obstacle behind which you can organize a perimeter defense.

The site is well chosen in a clump of spruce trees which will furnish concealment, protection from the wind, and building materials for the camp. You call the squad leaders and make a reconnaissance of the perimeter defense area while the platoon sergeant sets up local security. The men must keep moving so they will stay warm while tents are being set up and fires are started. After you assign the squad leaders their sectors of the defense, they move their men and start digging in.

While the perimeter defense is being set up, the platoon sergeant takes a detail of four men and starts breaking a trail around the defensive position six to eight hundred meters out. When this perimeter trail is completed, two or three-man patrols will ski around it to provide early warning of the approach of enemy. In addition, the patrols will watch for any tracks crossing the perimeter trail into the area at other than authorized places. (Friendly troops cross only at places where guards are posted.)

During the move, equipment for the platoon was carried on sleds (ahkios) located at the rear of the column where they would not slow the rest of the platoon. Since the ahkios have lagged behind as expected, you send a detail back to help pull them in.

Normally a unit operating in extreme cold is organized into two-man buddy teams so that each man can take care of his buddy, especially in the prevention of cold-weather injuries. It is difficult to detect frostbite on your own face, but your buddy can readily see the telltale white or gray color which is characteristic of frozen flesh. In addition, the buddy system increases the effectiveness of a unit because the presence of a buddy makes a man feel more secure in the cold, dark, subarctic nights. Knowing this, your platoon has prepared two-man positions in the defense.

As you check the perimeter, you

notice that many positions are cleverly concealed beneath the lower boughs of large trees, where the snow has left a hollow. Other positions are merely prone shelters in the snow, it being impossible to dig into the frozen ground. You make sure that all positions have around them at least thirteen feet of loosely fallen snow or seven feet of packed snow as protection from small arms fire. Fields of fire have been cleared by cutting only the lower branches of trees. Leaving the trees standing improves the passive air defense of the position. For this reason, also, the snow in open areas is left undisturbed as much as possible, since tracks in the snow are readily apparent from the air.

During the march, platoon machineguns were mounted facing forward on ahkios, and were half-loaded, ready for instant use while being towed along the trail. Since these ahkios are lighter than equipment ahkios, they have no trouble keeping up with the troops. In the defense, machineguns are mounted *sideways* on ahkios to provide stability and flotation in the deep snow.

As each squad completes organizing its sector, it starts preparing the campsite. Since the platoon has a strength of only 30 men, you have organized it into two tent groups of 15 men each. Details from each tent group cut firewood and spruce boughs, erect tents, and build rifle and ski racks. By this time, the heavy equipment ahkios have arrived, and the teams are digging positions, 50 meters apart, where the two tents will be erected. The firewood details make good use of the additional cutting tools (bucksaws and axes) which were brought in by the ahkios.

The tents are set up and the floors are laid after all the other tasks are completed. (If the tents are put up too soon, men tend to gather inside to get warm, whether or not they have completed their tasks.) Spruce boughs are used to construct floors at least one foot thick to act as insulation from the cold. The boughs are piled up near the tent sites until the tents are erected. The job requires a pile of boughs as tall as a man. In laying the floor, the men place the boughs in rows with the large ends of the boughs under the preceding row. This way, the soft ends of the boughs will provide a comfortable surface on which to sleep or sit.

The tents used are hexagonal ten-man arctic tents with an outer shell and an inner liner. Tent ropes are securely tied to trees or to logs buried in the snow, and the telescoping metal pole is erected in the center of the tent. Snow is piled around the side walls to make the tents wind proof and to provide insulation. A couple of overwhite parkas are placed on top of the tents to camouflage them. After the tent is up and the floor is laid, a Yukon stove is set up. Snow is sprinkled on the tent where the stove pipe comes through the top, to aid in fire prevention if the pipe gets too hot.

As soon as the fires are going, the tents warm up and the men start drying their clothing, which is damp more from perspiration than from the snow. One man in each tent is appointed to cook, and he starts preparing C-rations and melting snow for drinking water. Everyone's canteens have been frozen for some time and the men are dehydrated. Since melting snow is a slow process, it is done continuously. When everyone has had enough to drink, a pot of water is heated for drinks and shaving. A pot of water is also kept near the stove at all times in case of fire.

A fire guard is always on duty in each tent. Tents burn in five seconds, and even if the occupants escape burns, they may receive cold injuries because of the loss of their shelter, clothing, and equipment. Liquid fuels such as gasoline *can* be burned in a Yukon stove, but their presence multiplies the fire hazard. Another reason for burning wood is that enough gasoline to heat the tents would weigh too much and would slow the unit. A wood fire is hot enough that, if the tent is insulated prop-

Details from each tent group prepare the campsite.

One man in each tent heats C-rations and melts snow for drinking water.

erly, men may sleep comfortably without sleeping bags. Because of this, you decided to move without the 15-pound sleeping bags on this trip.

Although you have assigned 15 men to each ten-man tent, they are not crowded, because several men are outside on guard duty at all times. When your platoon first moved into the area, the platoon sergeant set up a local security which was changed over to a regular guard detail when the camp was completed. If contact with an enemy were imminent, you would have men on the defensive positions in addition to the guard detail. In this case you are organized behind a good obstacle, and contact is not imminent. Instead, you have an alert force of one-half of each squad fully dressed and ready to go at all times. Since nobody is using sleeping bags, the other half of each squad will be fully dressed except for their insulated combat boots which will be drying. You and the NCOs take turns in making frequent checks of the guard. In fact, someone checks the guards constantly to keep them alert.

Weapons are stored outside tents to prevent condensation and ice from forming on them because of temperature changes when they are brought into the tents and taken outside again. All weapons are thoroughly cleaned and very lightly oiled, since excessive oil on moving parts is likely to freeze and cause the weapon to malfunction. One automatic weapon is kept inside each tent for emergency use.

Communications consist of one reel of communication wire, three sound-powered phones, an AN/PRC-6, and an AN/PRC-10 radio. The PRC-10 is kept inside your tent near the stove where it will keep warm. Radios outside will work for only a few minutes until the batteries freeze. Once the batteries thaw out, the radios will work again. In order to conserve good batteries, you have the radio plugged into a weak battery, not strong enough to transmit but with enough strength to receive. However, the battery case is removed, and the radio is near a fresh battery for use if it should be necessary to transmit.

As the steady rushing noise of the radio indicates it is functioning properly, you prepare for the long wait until the company arrives. You know not what the long arctic night will bring, but you are satisfied that whatever happens, you and your men will be ready.

Glossary of Arctic Terms—continued from page 9.

Glacier—Large, slowly moving mass of ice in mountains and polar regions.

Hypothermia—Lowering of the body temperature by prolonged exposure to cool or cold temperatures, especially applicable to immersion in cold water.

Ice Auger—A tool for cutting holes through ice to obtain water or to emplace explosives.

Ice Ax—An instrument similar to a pick, consisting of wooden shaft, metal adze, pick, and ferrule, intended primarily for cutting holes in snow and ice, as an aid to balance, and for probing for concealed crevasses.

Icecrete—A mixture of sand, gravel and water poured into forms and frozen. The process is much the same as making concrete, except ice forms the bonding material.

Layer Principle—A clothing principle by which insulation is attained by trapping dead air in the spaces between successive layers of clothing.

Lichens—A lichen is a composite organism consisting of fungus living symbiotically with an alga. It is a type of air plant growing as epiphytes, on rocks, bark, etc. It does not have roots, stems, branches, leaves or flowers. Suitable for reindeer forage.

Mukluk—A seal or caribou skin boot commonly worn by Eskimos. The Mukluk Boot used by the Army is frequently referred to as the Eskimo Kamik. It has dry-tan leather or rubber soles and canvas uppers extending up to just below the knees.

No-see-um—A small insect which can hardly be seen.

Pemmican—An Algonquin word for a concentrated food of pounded meat and fat, with berries or sugar sometimes added. In military usage, the term is applied to any concentrated emergency ration which contains some meat and fat.

Reindeer—Any of several species of deer of the genus Rangifer, inhabiting the Northern parts of Asia, and Europe. The North American species are known as Caribou. Natives use them as food and in some areas as draft animals.

Rucksack—Canvas bag with light metal frame and shoulder harness, used for carrying clothing and equipment on the back. A type of knapsack used by mountain and ski troops.

Skijoring—Towing of one or more skiers by animals or mechanical vehicles.

Sky Map—The mirroring of land, water, snow in the clouds. A sky map approaches perfection as the clouds on an overcast day approach uniformity.

Snowcrust—Crust on surface of snow often capable of bearing the weight of man.

Snowdrift—A mound of snow built up by the wind, usually in the lee of an obstruction. Snow being carried by the wind.

Timberline—The upper limit of erect trees in mountainous regions. The northern limit of erect trees in the Arctic.

Whiteout—An overcast sky and snow-covered terrain combine to create a condition of visibility which makes recognition of irregularities in terrain very difficult. Fog will sometimes create a similar condition.

Survival Kit

M/Sgt Townsend H. McCaskey, Inf

A SIMPLE survival kit can be constructed by any Infantryman, a kit which could save his life by enabling him to make his way safely from wilderness to civilization. It is composed of materials which are available to all, and is contained in a car wax can or large shoe polish can.

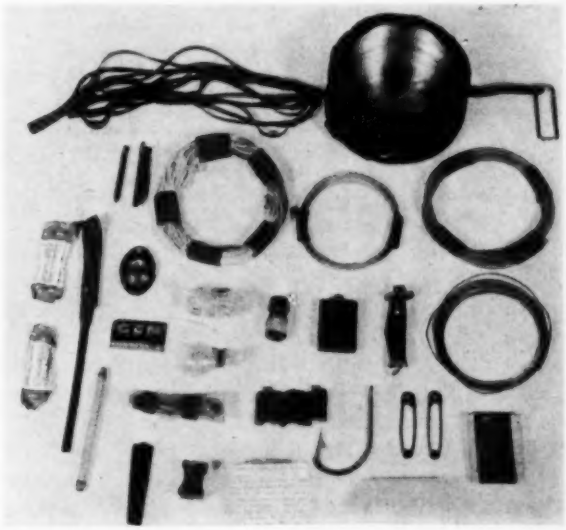
This kit should be carried inside the shirt or in a pocket, not taped to a pack strap or belt. It should be taken on any venture which has inherent in it the potential of being lost or of being caught behind enemy lines.

On this page are two photos. The first shows the kit complete, except that the bottom of the can has been replaced by a piece of glass to show how items pack into it. The actual kit, of course, is the can as it was made. The second photo shows the individual items which are integral to this kit. On another page of this issue of *Infantry* is a copy of the Ground/Air Emergency Code, an item which should be a part of every survival kit.

These are the items of the kit, with a short description of the use to which each is put, or an idea for a source.

- Signal Mirror. Or the shined top of a can.
- Sling-shot Rubber. Sling-shot for small game.
- Snare Wire. Trip Wire. For small game.
- Cord. For bow string or snare.
- Nails. Cut in half for use as spear points.
- File. Break off 1-2 inches to keep.
- Needle and Thread.
- Tarpon or Shark Hook. Tied to pole, makes good gaff.
- Fish Line & Hooks. Use inch of dog tag chain as lure.
- Small Compass.
- Magnifying Glass. For fire-starting.
- Cartridges. Powder is good fire starter.
- Wax Candles. Fire-starter in rain or snow.
- Razor Blades.
- Water Purification Tablets. For **all** water consumed.
- Small Knife. Keep sharp.
- Safety Pins. As pins or fish hooks.
- Matches. Securely waterproof these in kit.
- Bandage Strips.
- Prophylactics. Two-quart water container. Use straw to drink.
- Ground/Air Emergency Code.
- Rubber Tube. For straw or sling shot. Medics have.
- Flint & Steel.
- Pencil and Sharpener.
- Hack Saw Blade.

When the kit is assembled, seal it and paint it with black or OD paint, both for camouflage and added waterproofing. A kit like this, plus a little courage and know-how, will bring you back from anywhere.



REORGANIZATION OF THE INFANTRY—III

This is the third in a series by Infantry *on the new organization. Following is a completion of Part II on Division organization, after which is material on new doctrine, tactics and techniques. Ed.*

Tank Battalion

Tank support for the division is provided by the Tank Battalion (Figure 1). It is a triangular organization with a Headquarters and Headquarters Company and three tank companies. Each of the tank companies is equipped with 17 tanks. The battalion is employed as a unit assigned to a brigade, or as tank companies attached to Infantry battalions to further enhance their capability for ground combat. Each tank battalion has two organic armored vehicle launched bridges (AVLB) 60 feet long which allow tanks to cross short gaps.

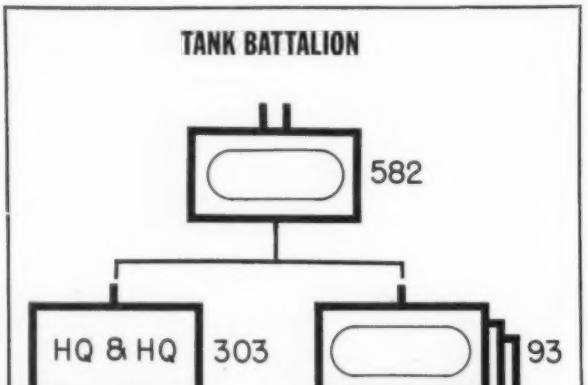


Figure 1

Cavalry Squadron

The division Cavalry Squadron (Figure 2) performs ground and air reconnaissance and provides security for the unit to which it is assigned or attached. It can engage in offensive, defensive, and delaying action as an economy-of-force unit. It is organized with a Headquarters and Headquarters Troop, three Armored Cavalry Troops and one Air Cavalry Troop. The Armored Cavalry Troop has organic to it a Troop Headquarters and three Armored Cavalry Platoons. These platoons are organized like the Reconnaissance Platoon of the mechanized Infantry battalion, in that they too have a platoon headquarters, a tank section employing two light tanks, a scout section which uses four ¼-ton vehicles each mounting an M60 machine-

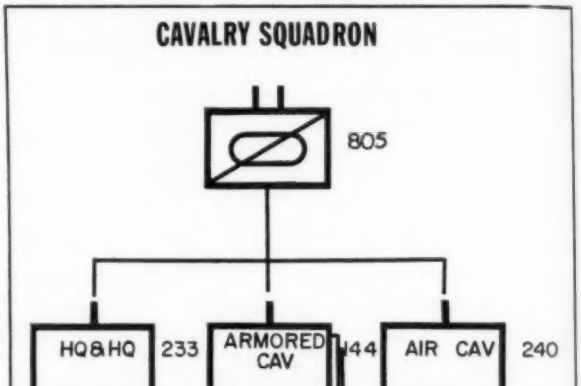


Figure 2

gun, a rifle squad consisting of ten men, and a support squad. Organic to the support squad is a self-propelled, full-tracked carrier for the 4.2-inch mortar. In the airborne division there is a Reconnaissance Squadron consisting of two cavalry troops.

Air Cavalry Troop

The Air Cavalry Troop (Figure 3) contains the Aero Scout Platoon (nine observation helicopters and four utility helicopters, each mounting an integrated machinegun and two antitank guided missiles), the

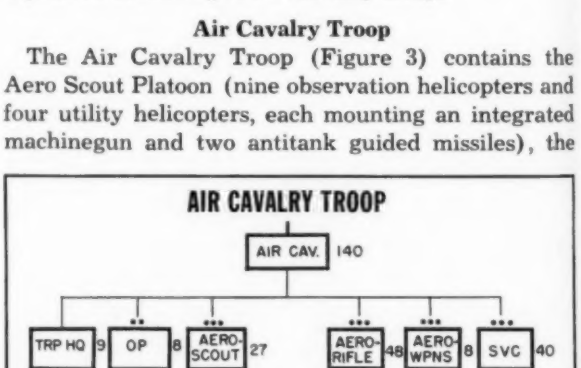


Figure 3

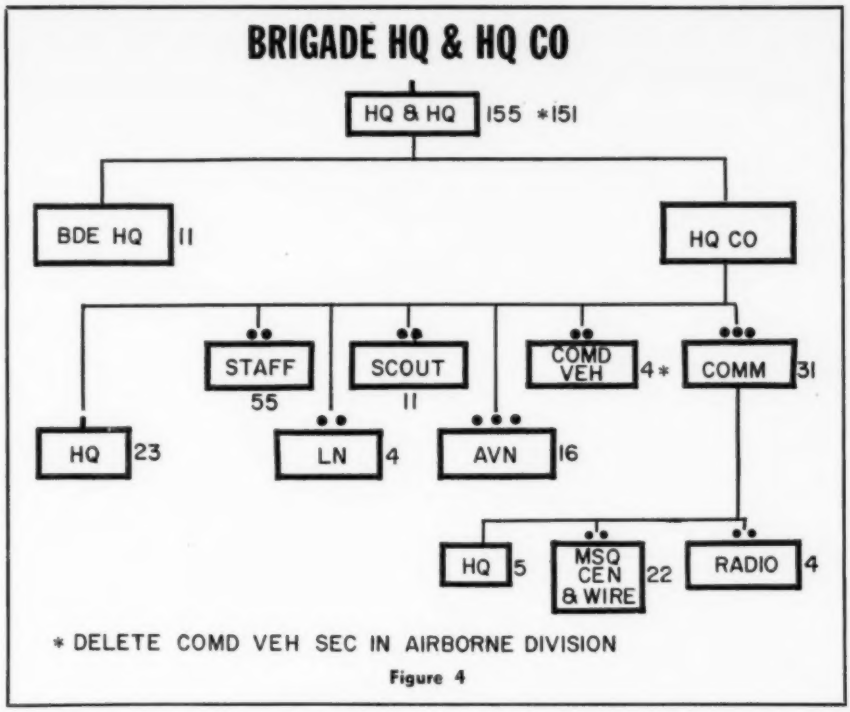


Figure 4

Aero Rifle Platoon (with five utility helicopters), and the Aero Weapons Platoon (with four utility helicopters each mounting a quadruplet kit machine-gun and a 2.75-inch or 4.5-inch kit rocket).

Brigade Headquarters and Headquarters Company

The Brigade Headquarters and Headquarters Company (Figure 4) is basically the same in all divisions. The brigade is commanded by a colonel (or a brigadier general when authorized by DA) who is assisted by an executive officer (lieutenant colonel) and a complete staff consisting of: majors S2, S3, S4, Surgeon, Chaplain; and captains S1, Chemical, Communications Officer, and three Chaplains. The Sergeant Major is the only enlisted man on the brigade staff. The company has a company headquarters section, staff section, liaison section, scout section, aviation platoon, command vehicle section (except in an airborne brigade) and a communication platoon. The Forward Area Signal Center brings communications to brigade, but brigade and lower units have a limited wire capability and therefore must rely upon radio as the primary means of communication. The Brigade Commander, through the Brigade Headquarters and Headquarters Company, commands from two to five maneuver battalions.

Division Artillery

In addition to supporting the battalions with indirect fire at ranges out to 39,000 meters, the Division Artillery (Figure 5) provides the division with an organic nuclear weapons delivery capability. The artillery is commanded by a colonel. In combat, the headquarters will establish itself as an alternate division command post. Division Artillery is organized with a Headquarters and Headquarters Battery; three Artillery Howitzer Battalions, 105mm (towed in Infantry and airborne divisions; SP in mechanized and armored divisions); one Field Artillery Howitzer Battalion, 155mm/8-inch (towed in Infantry division and SP in mechanized and armored division); and an Artillery Missile Battalion. There are three batteries (six tubes) of 105mm howitzers in each 105mm battalion. There are three batteries (six tubes) of 155mm howitzers in the 155mm/8-inch

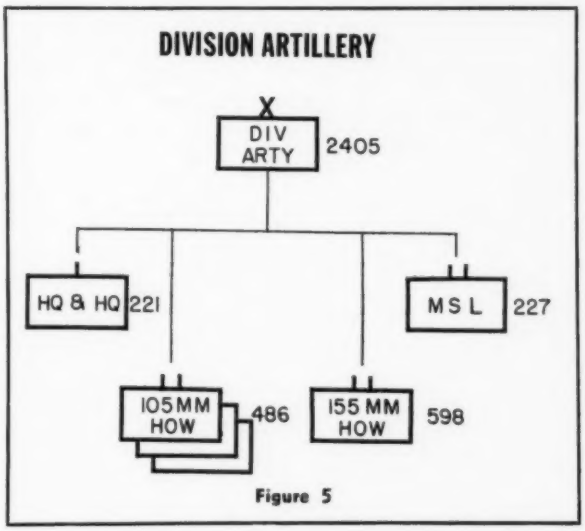


Figure 5

howitzer battalion. There is one battery (four tubes) of 8-inch howitzers (towed) in the 155mm/8-inch howitzer battalion. There are four Honest John launchers in the artillery missile battalion. In the airborne division, the Field Artillery Howitzer Battalion contains one battery of 155mm and two field artillery missile batteries. The missile batteries employ four Little Johns in place of four Honest Johns.

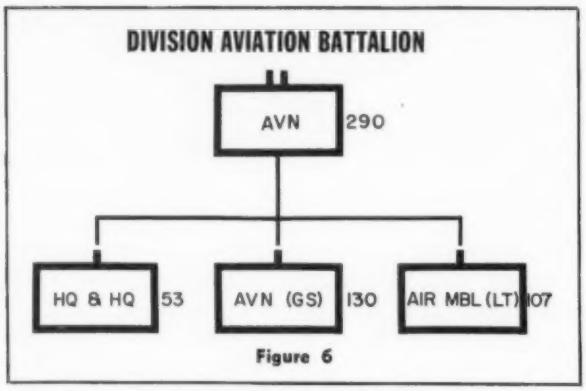


Figure 6

Aviation Battalion

The Aviation Battalion (Figure 6) is identical in all divisions and consists of a Headquarters and Headquarters Company, Airmobile Company (Light) (Figure 7) and an Aviation Company (General Support) (Figure 8). In the light airmobile company there are 24 utility helicopters in the three airlift

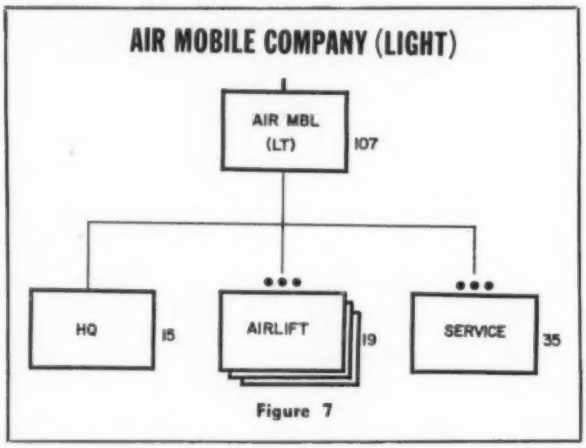


Figure 7

platoons. In the Aviation Company (General Support) there are four airplanes (medium observation in the aerial surveillance platoon; six utility helicopters and ten observation helicopters in the general support platoon; and a combat surveillance drone system consisting of 12 drones.

Engineer Battalion

The Infantry Division Engineer Battalion (Figure 9) increases the combat effectiveness of the division by means of general engineer work. This is accomplished by providing fixed bridging for passage of

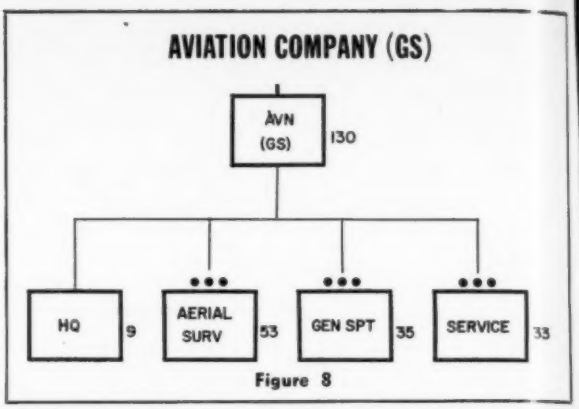


Figure 8

short gaps; general construction, to include construction of landing strips; and the construction, repair, and maintenance of roads, bridges, fords, and culverts. It can also prepare and execute demolitions, including employment of prepositioned nuclear weapons. It is reponsible for purification and supply of water throughout the division. The battalion contains a Headquarters and Headquarters Company, four engineer companies, and a bridge company. (One engineer company and the bridge company are deleted from the airborne division.)

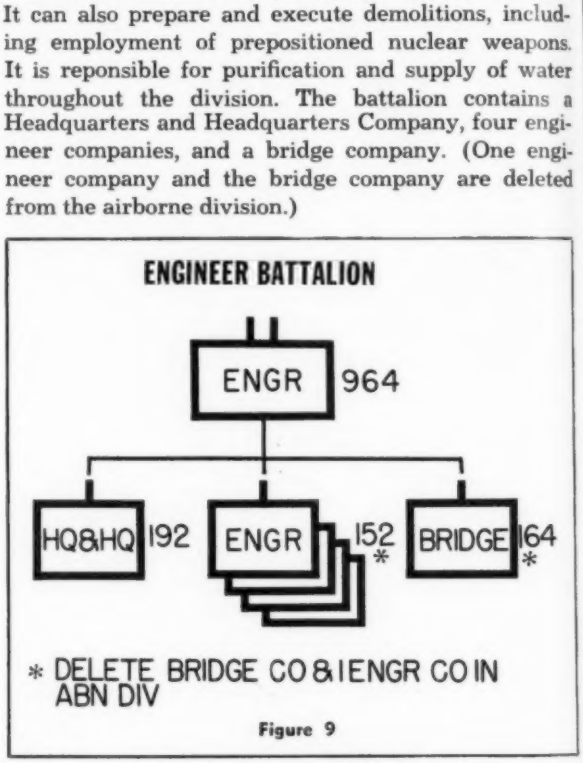


Figure 9

Signal Battalion

The Signal Battalion (Figure 10) assists the division commander in controlling the units of the division. The battalion is organized with a Headquarters and Headquarters Company, a Command Operations Company, and a Forward Communication Company. The battalion establishes an area communication system, installing a forward area signal center in the vicinity of each brigade. The brigade ties in its wire net to the signal center. In addition to wire, the center provides radio, radio relay, teletypewriter, and message center service. If one of the forward area

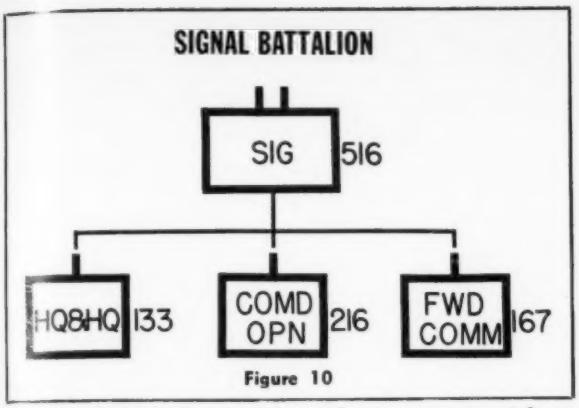


Figure 10

signal centers is destroyed, another center can pick up the flow of communication traffic and maintain continuous communication throughout the division area.

Support Command

In the Support Command (Figure 11) are found the service support elements of the division. The support command headquarters is a tactical headquarters. The commander, a colonel, is assigned a lieutenant colonel executive officer and a staff (majors S1, S2, S3, and S4). In addition, there is a Chemical Officer, Chaplain, Assistant S3 and S4, two liaison officers, and the Support Command Sergeant Major. All support is provided on a functional basis.

The Headquarters and Band Company contains the command headquarters, company headquarters, headquarters section, division ammunition office (DAO), and the band.

Within the Administration Company are located the Information Section, Inspector General's section, Staff Judge Advocate's section, Finance section, Chaplain section, and Adjutant General's section. It is within the Adjutant General's section that records are maintained for all members of the division.

The Medical Battalion, through the Headquarters and Support Company and three medical companies, is organized to provide evacuation of casualties, using the ¾-ton enclosed ambulance, from the forward elements of the division to clearing stations established by the medical companies. Here the casualties are given emergency type treatment and either sent back to their parent units or prepared for further evacuation to Army medical installations. The Supply and Transportation Battalion contains a Headquarters and Headquarters Company, Supply and Service Company, and the Transportation Motor Transport Company. Within the Headquarters and Headquarters Company are found representatives of the engineers, ordnance, quartermaster, signal, and transportation technical services to assist in the functional issuing of supplies and the performance of maintenance. The Supply and Service Company contains a Class I and III supply platoon, Class II and IV supply platoon, bath section, and (when authorized) a graves registration platoon. The Transportation Motor Transport Company supports the division with sixty 2½-ton trucks and trailers, twenty

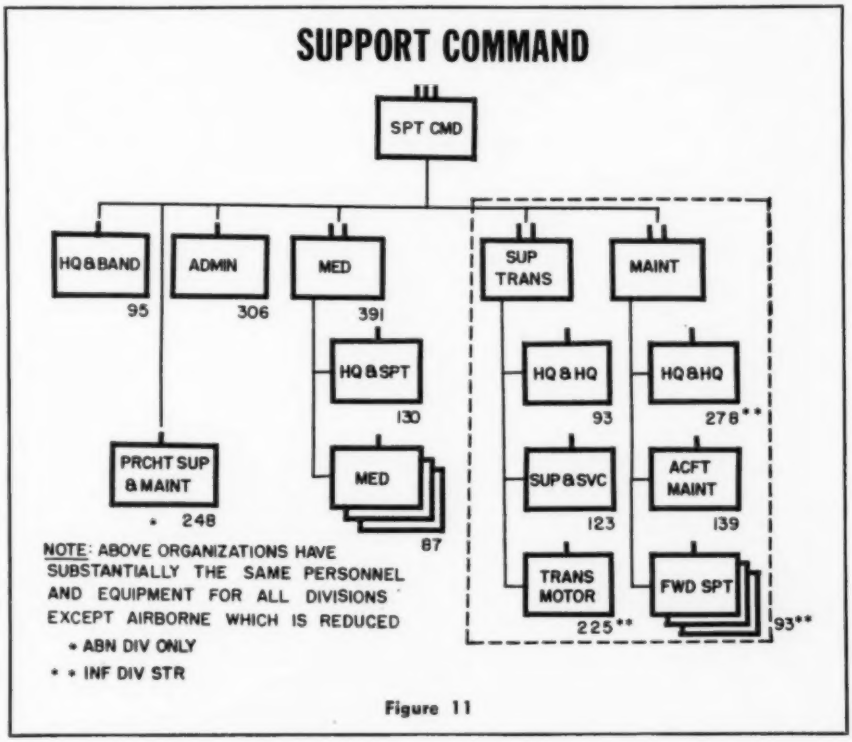


Figure 11

5-ton tractor trucks, twenty 12-ton semi-trailers, and ten 1200-gallon tankers (*mechanized* Infantry has 20 tankers).

The Maintenance Battalion contains the Headquarters and Main Support Company, Aircraft Maintenance Company and three Forward Support Companies. Normally, one of these forward support companies operates in support of each brigade. It is within this battalion that the personnel strength of the Support Command of the Infantry, Airborne, Mechanized, and Armored Divisions vary considerably. The Aircraft Maintenance Company services all aircraft within the division. Through the forward support platoon (four rotary wing and one fixed wing sections), a large portion of the maintenance is completed at the supported unit locations. A main support section provides back-up support.

In the airborne division, all elements (personnel and equipment) of the support command are decreased. There is added, however, a Parachute Supply and Maintenance Company.

Common Division

Within division Headquarters and Headquarters Company (Figure 12) we find the command section of the division. It consists of the division commander, a Major General; two assistant division commanders, Brigadier Generals; aides; and enlisted assistants. The commanding general is provided a complete general staff.

The Military Police Company, through four military police and one security platoons, assists in he enforcement of discipline throughout the comm nd and provides security to the division forward (ma n) command post. In the airborne division there are only three military police platoons.

In summary, the division is a combined arms t am consisting of a common division base and var ing combinations of battalions which determine the t pe division.

TYPE	BATTALIONS
INFANTRY	8 Infantry, 2 Tank
AIRBORNE	9 Airborne Infantry, 1 Light Tank
MECHANIZED	7 Mechanized Infantry, 3 Tank
ARMORED	5 Mechanized Infantry, 6 Tank

The organization described in this and the last issue of *Infantry* represents the current status in the Army's effort to achieve a greater combat capability through an evolutionary process. Undoubtedly other changes will follow. In any event, as the remodeling of the Army continues, it is a certainty that Infantry will continue to play its time-honored role. For as General Maxwell D. Taylor has stated, emphatically, "In the final analysis, all our efforts toward improvement seek but one principal end. It is to provide the Infantry, as the versatile basic arm of close combat, with a superior differential of sustained, mobile combat power, capable of delivery at the decisive point in time and space, under all conditions of combat."

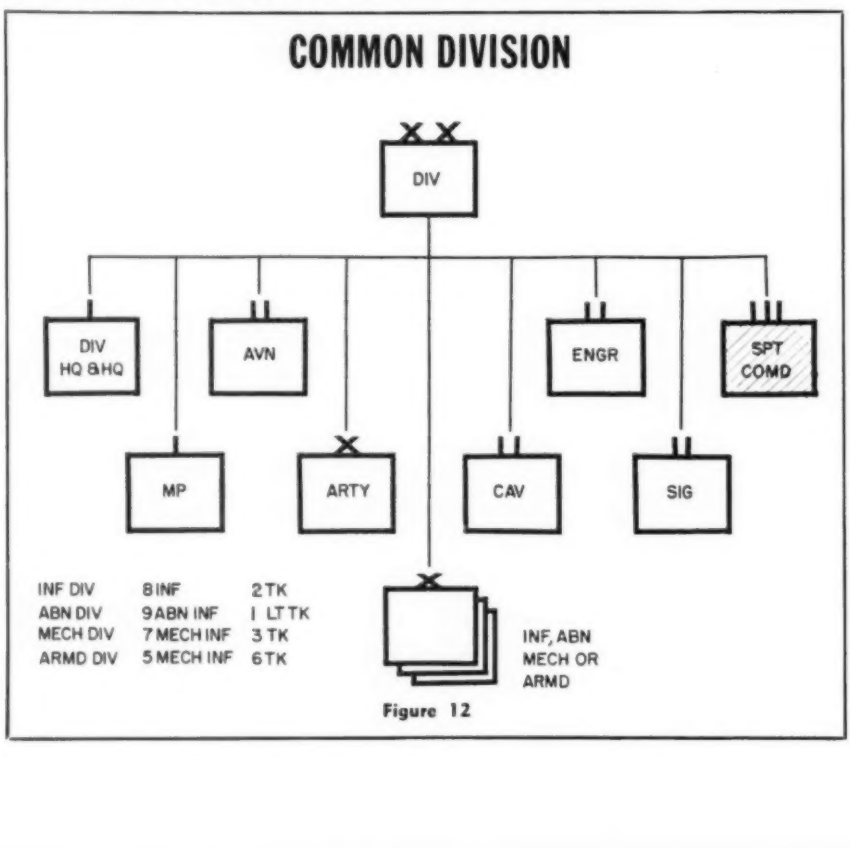


Figure 12

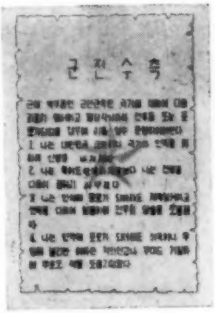
LETTERS TO THE EDITOR

Continued

CODE OF CONDUCT

• In the May-June issue you asked for information from readers concerning countries other than the United States that have a Code of Conduct. Inclosed is the Code of Conduct of the Army of the Republic of Korea. You'll have to get a ROK student to translate it for you if you want the exact English equivalent.

Lt Colonel Norman Carlile
U S Army Instr Unit (ROTC)
University of Oklahoma
Norman, Oklahoma



(Approximate translation: "1. I am an honorable soldier of the Republic of Korea. I will willingly give my life for the sake of my country. 2. I will never surrender and will fight for right. 3. If I become a prisoner, I will with all my ability resist continuously and will try to escape and assist my comrades to escape. 4. If I become a prisoner of war, I will reject advice and favored treatment by the enemy which is harmful to my country and its allies. I will never assist the enemy." Developed with assistance from Captain Choi Sang Seup, ROK Army.)

MORE ON THE CODE

• In the (May-June) issue of *Infantry*, one of your readers was asking. . . . "Do other countries have something similar to our Code of Conduct?"

I think that a summary of the essentials of the creed of every fighting man, put under the very simple pattern of a code, easily understandable and likely to be learned by heart, is to be found only in the Armed Forces of the United States. But other countries, through different ways, emphasize also the rights and obligations of the fighting man. . . .

. . . You will find in the military regulations of Great Britain . . . France, Germany, and the cosigners of the Conventions of Geneva and The Hague, ideas very similar to the ones expressed in the Code of Conduct of the U. S. Armed Forces, if not under the same pattern.

Lt Col P. Aussaresses
French Liaison Officer, USAIS
Fort Benning, Georgia

FROM GUATEMALA

• I would like to have authorization from INFANTRY MAGAZINE to translate to Spanish and submit it to the REVISTA MILITAR—a publicaition of the Guatemalan Army—such material as "THE M79 CLOSES THE GAP" and "BLIND, HALT, DESTROY" of the July-August issue.

2 Lt. Marco R. Asturias
Instructor Reservas Militares
San Cristobal Totonicapan, Toto
Guatemala, C. A.

Granted. Ed

FEATHERS AREN'T BIRDS

• I would especially like to thank Capt Frank J. Simmons for his fine article titled "Feathers Aren't Birds" (July-August). He expressed my feelings exactly on the uniform. My suggestion is to adopt a type uniform like the Marines have . . . stencil on the uniform "US Army," wear no patches at all on the fatigues and field uniforms, and wear pin-on name tags on fatigues and field uniforms when in garrison, and wherever else needed. These could be taken off when involved in tactical problems if desired. The blocked cap could be done away with, and in its place wear the cap, field, cotton w/ear flaps. . . .

VERNON R. WHITE
2d Lt, Inf
Co B, 2d BG, 12th Inf
Fort Riley, Kansas

BAH BAH

• The following . . . deals with "Bah Bah Black Sheep" in the July-August 1961 issue.

As a Marine Corps officer who has spent time slogging on foot with the Infantry, riding as observer in L-19 type aircraft, and now primarily as an artilleryman, I have become concerned with articles such as this which appear in service publications. No doubt the author believes what he puts on paper and musters every available argument to support his case. Unfortunately he often ignores fundamentals.

We must put the individual rifleman on the real estate. To this end everything else should be considered "support." Within the Infantry, the method of getting the rifleman on the spot has become quite a matter of discussion. Various factions want him to walk, jump out of an airplane, step out of a helicopter, land from an amphibious craft, ride in a truck, enter all the way in an armored carrier, and so on. Regardless of the way in, we have to keep him there and open things up for him to move.

The author states that Infantry makes a mistake trying to use the 4.2 as some kind of artillery [with] "Junior Redlegs" for crewmen. The "secret" is supposedly the tremendous volume of fire . . . "240 rounds into an area approximately 300 meters wide in two minutes." If we try this very often, where is the Infantry commander to get the logistical support to keep it up or make replenishment?

I agree that a 4.2 doesn't belong in the artillery. However that isn't under discussion. The Army has given it to the Infantry and I feel the battle group commander would make a grievous mistake to allow its disintegration to an area saturation weapon. When the chips are down and he hasn't what artillery needs, he'll find his "personal artillery" worth its weight in gold plugging up holes—not just "areas."

I say again, when we state an argument for a given weapon, take *all* essentials into consideration. If the gun goes off tomorrow, we will take what we have and fight with it. Don't forget we have experience with tools in hand and we want to use them to the limits of their capabilities. Maybe some battle group commander will be stuck in a spot next week where the only thing he can count on for heavy support is a 4.2 platoon with limited ammunition. If we aren't able to do the job with a few rounds because we don't have the know-how or experience, we have let him down—and the Infantryman on the real estate is the guy who suffers.

Capt. Paul E. Wilson, USMC
Commanding Officer
Marine Barracks, USNMF
Point Arguello, Lompoc
California

• The editor's note, "The opinions expressed in this article are those of the author and do not necessarily reflect thinking of DA or USAIS," following *Bah, Bah Black Sheep*, by Captain Kelman, July-August issue of *Infantry*, brought a sigh of relief from me.

Major William R. Ellis
US Army Instructor Unit (ROTC)
Panhandle A & M College
Goodwell, Oklahoma

PERSHING BIOGRAPHY

I am writing a biography of General John J. Pershing (1860-1948), commander of the AEF in World War I. I would appreciate hearing from anyone who has letters, anecdotes, reminiscences, or other information about General Pershing.

Donald Smythe, S. J.
Washington 7, D. C.
Georgetown University

Defense of a River Line

Maj William A. Brown, Inf.

This is the first of a series of articles concerning several significant changes of Infantry doctrine which will evolve to accommodate the new Infantry organization. The doctrine contained in this article is not wholly new, but rather it represents a change in emphasis in certain techniques for defense of a river line. Editor

What formations will the new battalion use in the offense? On what frontages will it defend? Will there be significant differences among the tactics for Infantry, airborne Infantry, and mechanized Infantry? How will the new tactics compare to the 1950-vintage Infantry battalion?

These and many other questions are answered in *draft* Department of the Army Field Manual 7-20, "Infantry, Airborne Infantry, and Mechanized Infantry Battalions," which was prepared by the Infantry School and recently forwarded through USCONARC to DA for approval and publication.

Essentially, the new battalion field manual combines the old and the new. Tried and proven concepts have been incorporated into the manual, and deviations from already-approved doctrine have been made only where appropriate due to changes in weapons and organization. The new doctrine is not, however, merely a re-hash of the old. Changes have been made where necessary to maximize the flexibility of the new organization. One such area of change is in the techniques for a defense of a river line as described below.

* * *

There are two different concepts for defense of a river line. One envisions preventing the enemy from crossing the river; the other envisions delaying the enemy's crossing the river, and then striking him when he is astride the river and before a large-scale build-up on the near bank.

A commander of an Infantry, airborne Infantry, or mechanized Infantry battalion may conduct a defense of a river line by either of two methods. (1) He may make maximum use of the river as an obstacle and use the bulk of his battalion on, or immediately near, the river line; or (2) he may defend with minimum forces on the river line, holding the bulk of his battalion in reserve as a mobile counterattack force. The determination of which type of defense to use will depend on the unit's mission, the weather and terrain, and the friendly and enemy situations. In most instances, the terrain on the near and far banks will be the dominating factor.

These factors would favor using *maximum* force (Figure 1) on the river line:

- A narrow sector, wherein the battalion can organize a strong defense on the river line.
- Observation and fields of fire on the near bank which are equal to, or greater than, those on the far bank.
- Generally good defensive terrain on the near bank (concealment, cover, observation, fields of fire, no obstacles immediately to the rear, etc.).
- Poor *relative* mobility, or poor trafficability, in the area adjacent to the near bank, thus restricting quick movement of a reserve.

These factors would favor using *minimum* force (Figure 2) on the river line, and thus would favor a more mobile operation:

- A wide sector, wherein the battalion could not organize a strong defense on the river line.
- Observation and fields of fire

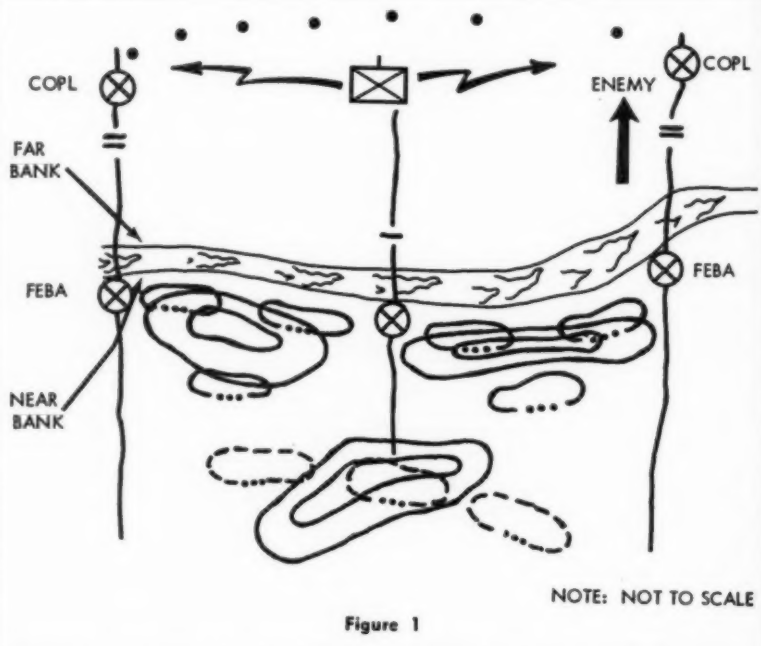


Figure 1

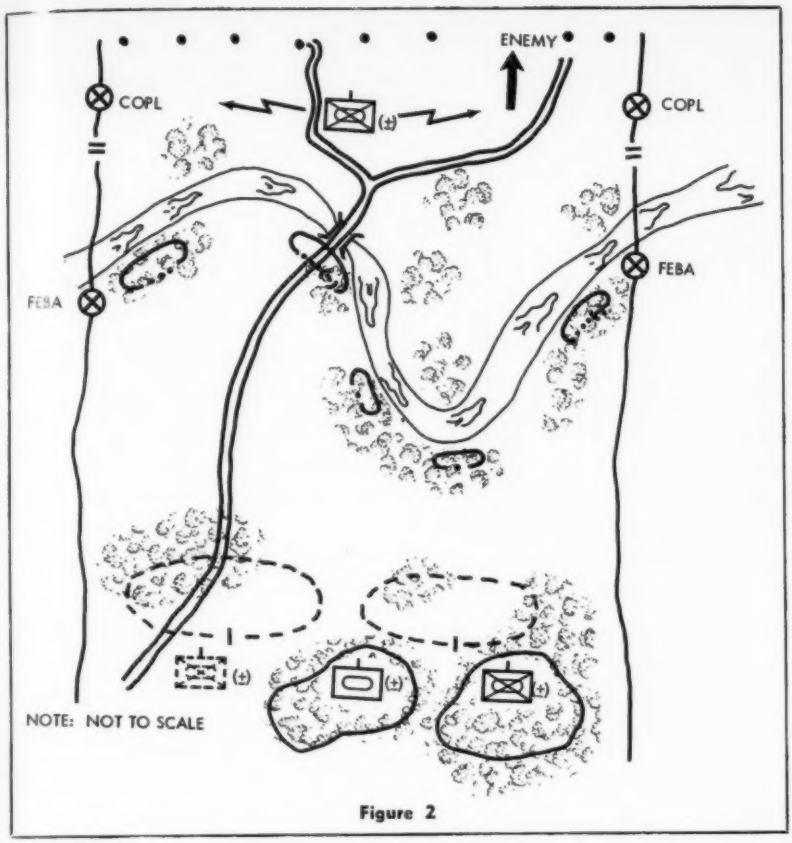


Figure 2

from the *far* bank superior to those on the near bank.

- Poor defensive terrain on the near bank.
- A serious salient or re-entrant caused by configuration of the river which allows the enemy to outflank the river line defenses.
- Good *relative* mobility and trafficability in the area adjacent to the near bank, thus permitting quick movement of reserve forces.

After the battalion commander has determined which type of defense his unit will conduct, he follows the same techniques as for planning other defensive operations. Special emphasis, however, must be given to several matters.

Analysis of Defensive Sector

The river velocity, along with trafficability and slope conditions of both banks, the river bottom, and the shores, must be considered in relation to the enemy's capability of launching an attack in armored vehicles which can swim or ford the river. Crossing sites for such vehicles must be denied the enemy by means of strong defenses there, by mines, by destruction of fording sites, and all other means available. Bridges should be prepared for destruction, but should not be destroyed until a time appropriate to the unit's mission (see Security Forces).

Braided rivers usually should be defended at the strongest channel, but due regard must be given to limitations imposed by any obstacles in the defensive position.

When minimum force is used on the river line, blocking positions are organized usually on the first good defensive terrain away from the near bank.

Forces on the FEBA

When maximum force is used on the river line, the defense is organized as a normal area defense. When minimum force is used, the battalion commander establishes strong points at key crossing sites. He must determine what constitutes sufficient "minimum force" to delay enemy crossing forces and thus enable the friendly reserve to strike at the opportune moment. Strong points must be able to delay at least until a major part of the enemy force is astride the river, but before it can effect a large build-up on the near bank.

Frontage and Depth

In assigning frontages, primary consideration must be given to key terrain on the near bank, and to trafficable areas on *both* banks. When minimum force on the river line, gaps between strong points must be covered by patrols, fires, observation posts, listening posts, and all other available means. When maximum force is on the river, the terrain may dictate that the forward defense forces be disposed directly on the river line. In other instances, however, terrain may dictate that only the majority of the "maximum" force be on the river line, and that a portion will be slightly away from it (Figure 3). In either case, full advantage is taken of the obstacle.

The Reserve

When minimum force is on the river line, the battalion commander retains a strong, highly mobile reserve in blocking positions or assembly areas back from the river line. When maximum force is on the river line, the size and location of the reserves are the same as for a normal area defense. Timing of the reserve's counterattack is critical to a river line defense. The enemy *must* be struck when part of his force is on the near (friendly) bank, part is on the river, and part is on the far bank, if the defender is to achieve maximum destruction of the enemy and his crossing equipment. Defeat must be inflicted on ground (or water) of the defender's choosing, and must be prior to the time that the enemy has an adequate build-up on the near (friendly) shore. After successful counterattack, the reserve is normally returned to its former positions.

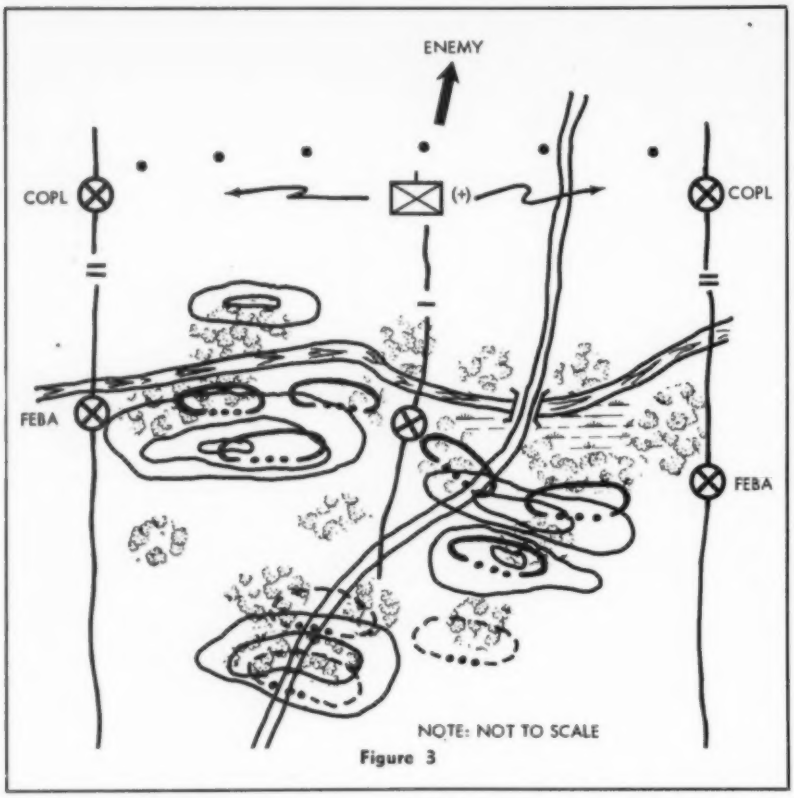


Figure 3

Security Forces

If a GOPL is being used, the battalion commander may find it desirable to establish local security on the far bank in lieu of a COPL. This security can be on terrain immediately adjacent to the river line, whereas a COPL is ideally placed on dominant terrain beyond the far bank. Security elements should protect approaches to the river, and should include waterborne patrols. Emphasis must be placed on counter-infiltration measures (patrols, warning devices, radar, infrared equipment, etc.), and on re-doubled efforts during periods of poor visibility. These matters apply also, of course, to the COPL if established.

The COPL may be manned by elements of either the reserve or the forward companies. Since APCs can swim a river, the COP should be mechanized if possible. Security forces, whether COP or other, must be given means of withdrawal over the river. Even if bridges exist, boats should be cached on the far bank with recovery ropes leading to the friendly bank. These should be guarded against capture or sabotage by enemy infiltrators. Air transportation may be planned in the event bridges are prematurely blown, boats are rendered useless, or other unforeseen incidents hamper withdrawal of security elements. (Bridges, when blown, must be thoroughly destroyed so that the wreckage does not offer assistance to enemy bridging effort.)

Rear Area Security

Since the enemy may conduct an airborne assault in conjunction with a river crossing, particular attention must be given to locating and protecting all possible landing or drop zones in the battalion sector. Hasty obstacles can be placed on these sites, and patrols may be used to provide security or warning.

Antitank Measures

All possible antitank measures are planned against enemy amphibious armored vehicles. Priority measures include construction and placement of obstacles, and emplacement of minefields on both near and far banks and in fording sites. Antitank weapons are positioned to protect crossing sites.

Fire Support Planning

Fires are planned to interdict all possible assembly areas for enemy troops and crossing equipment. Fires are also planned to strike all approaches to the river and all likely crossing sites. VT and mechanical time fires should be planned to strike the enemy while he is on the river.

Rehearsal

As in any other defensive operation, the counterattack of the reserve should be rehearsed if time and security permit. All elements of the battalion should participate so that confusion during counterattack is reduced to a minimum, especially during darkness or poor visibility. As a minimum action in lieu of rehearsal, detailed plans, as they affect both the reserve and the strong points, must be made clear to all elements.

* * *

Defending a river line is a difficult operation, but it must be remembered that the defender has a real (as well as psychological) advantage over the enemy who must cross that river. Timing, particularly of the counterattack, is of paramount importance, perhaps more so than in other defensive situations. A well conceived plan—one which takes every advantage of the terrain, weather, and enemy situation—can be turned into a successful defense against unusual odds.

* * *

These tactics apply to all Infantry battalions—airborne, mechanized, or "straight." The material in this article conforms to that in a new draft FM 7-20, now pending approval. Ed.

Soviet Winter Operations

(This issue is devoted to US Army operations in the Arctic. To understand better our own operations, the following is quoted from DA Pamphlet 30-50-1, *The Soviet Army*.

By studying Soviet Army techniques we can add to our own knowledge concerning operations in this part of the world.—Editor)

Soviet tactical doctrine for winter warfare is based on the principles of attack and defense, but details are fashioned to the peculiarities of combat in snow, ice, and extreme cold. [It] emphasizes the importance of the possession of roads and the use of inhabited areas and forests as protection from the cold. On the march along highways and roads, strict security is enforced because of the possibility of enemy surprise attacks to capture the road and [because] of the slowness of deployment in a meeting engagement in heavy snow or other extreme winter conditions. Operations plans are flexible in order to cope with any sudden changes in the weather.

In offensive operations under severe winter conditions, Soviet departure areas are positioned closer to the enemy front lines than during other seasons of the year. Heated shelters, dugouts, and bunkers are provided in these areas in an attempt to maintain the effectiveness of troops before they close with the enemy. Although considerable importance is attached to the use of ski-equipped troops, the assault is conducted without skis. On the other hand, when the battle reaches the depth of the enemy defense, ski troops are employed to outflank and envelop enemy strongpoints. In the initial assault, machineguns, mortars, rocket launchers, and accompanying support guns are mounted on sleds. Tanks, assault guns, and other tracked vehicles are used as prime movers and to break trails through deep snow. Helicopters may be employed . . . to bring in supplies and ammunition for the assault elements, and to fly out serious casualties. A major portion of the fire support for Infantry after a penetration comes from mortars, because the artillery and other wheeled vehicles may be restricted to the roads by the weather. Deep snow also restricts the number of usable artillery firing positions. During offensive winter operations, an attempt is made to destroy by gunfire and bombing any buildings which may be used for shelter by the enemy.

Soviet tactical doctrine stresses the use of long winter nights, snowfalls, snow storms, fogs, and intense cold for surprise operations, turning movements, envelopments and encirclements. In winter, advantage is taken of the natural concealment offered by falling snow, and attacks are carried out frequently in the midst of snowstorms. During World War II, the Soviets sometimes attacked in raging blizzards, particularly when the wind was blowing in the face of the Germans. The Germans discovered, however, that they also could use the weather to their advantage. Once the German troops had become aware of this aspect of Soviet tactics, they cleared the trenches at the first sign of attack and moved to both flanks. After the Soviets had passed the empty trenches, the Germans attacked from the flanks and the rear, and then it was they, the Germans, who benefited from having the wind at their backs.

The Soviet defense system for winter warfare closely resembles a defense on a wide front, in that the front is not continuous. Instead, the defense consists of a series of strong points and battalion defense centers built around high ground, natural obstacles, villages, and hamlets. Dead space is covered by fire, minefields, and obstacles. Counterattacking and second echelon troops are usually equipped with skis. The counterattack routes are preplanned and marked. The entire defense system is organized so as to minimize the effect of weather on Soviet personnel, while at the same time exaggerating its effect upon the enemy. The Soviets make extensive use of snow and ice to construct obstacles and dummy installations. Artillery fire is used in an attempt to force the attackers off the roads and compel them to advance laboriously across country. The Soviets attempt to destroy all cover in front of the defensive position which could be used by the enemy, so that an attacking force must cross open terrain.

The Soviets stress the construction of elaborate field fortifications in any defense, and this practice is followed in winter operations. Engineer troops are used both to assist and to supervise the construction of defensive positions. Because it is difficult to dig trenches in frozen ground, ice and snow are commonly used in the construction of fortifications and shelters. If trenches have been dug, they are often covered with canvas shields or wooden roofs to protect the occupants from the snow. Heated shelters are provided for the troops whenever possible.

Soviet defenses are established behind natural obstacles, such as deep snow, ravines, rivers and streams which will slow or stop enemy tanks and assault guns. If high ground is available, it is defended as part of the scheme to exhaust the attacking Infantry. In addition to the usual antitank and antipersonnel obstacles, the Soviets employ a number of obstacles peculiar to winter warfare. Snow banks may be turned into slippery obstacles by freezing them with water. On the other hand, the Soviets have been known to use artificial thaws, by blasting frozen rivers, to create water barriers. In laying mines, consideration is given to the depth of the snow and the expected fall. If the snow is extremely deep, the mines are placed on boards so that they will detonate more easily.

Because men tire more easily in extremely cold weather, provisions are made for frequent rest periods, and heavy physical work is evenly divided among the troops. Their diet is watched, and calorie intake is increased. Hot food and drink, the Soviets believe, must be provided regularly for troops in the forward positions. Steps are also taken to prevent frostbite. The Soviets believe that frostbite is preventable and severely punish personnel who neglect to take precautions. Medical aid stations are located closer to combat units than normal, and they are heated. Casualties are evacuated in covered vehicles equipped with blankets and extra warm clothing.

Weapons in extremely cold weather are protected with light coats of special winter lubricants. Inasmuch as severe cold also affects the ballistic characteristics of weapons, sighting corrections are made in accordance with special winter firing tables. In all defensive positions, strict snow-camouflage discipline is maintained. Special winter clothing and camouflage suits are issued. Personnel wear white camouflage capes; tanks, vehicles, and artillery are painted white. Some special units and equipment are employed in winter warfare. Motor-sled units may be used for troop transport and supplies, but their movement is restricted to relatively flat terrain. Ski units, equipped with submachine guns, are used for reconnaissance and patrolling. Helicopters play an important part in providing logistical support.

Never Trust A Naked Eskimo

(Things left lying on the Editor's Desk.)

- "It takes six full-grown caribou to dress one Eskimo."
- "Once the fire fight begins, the Infantryman must recall the law of mechanics."
- "If the guard falls asleep while watching a fire, the fire will go out and he will wake up when he gets cold."
- "The next time you have some excitement is when you are awakened by somebody stepping on you."
- "The people believed their remote location would discourage any invasion or occupation by a foreign power. However, in 1262, 1380, 1924, and again in 1941 . . . ."
- "Your communication sergeant has just given you this message and you can read between the lines."
- "What am I writing about?"
- "Snowflake . . . An agglomeration of snow crystals, usually damp. . . ."
- "It is possible to mop up a quart of dew in the early morning from airplane parts. . . ."
- "The most remarkable thing about this tiny nation is its vastness."

Shown here are the officers of the 23d Infantry in their distinctive new uniforms. These men are facing the challenge of Alaska, where the Russians have recently been occupying thousands of square miles of territory. Oh yes, the date: June 1867.

FEEDING PLAN FOR SUBZERO WEATHER

Capt Albert J. Smith, Inf

HOW MANY times have you gone hungry in the field? Never? Then perhaps you have come to take for granted that you and your men will always be fed. But in subzero weather, when the thermometer sometimes dips to −50° and the snow is often knee deep, the normally routine task of feeding a rifle company in the field can be a serious problem.

Confronted with the extreme climatic conditions of the arctic, a commander who has never operated in severely cold weather will soon be aware that one of the best ways to boost morale is to serve his men hot rations as often as possible. In trying to feed "A" rations prepared in the Army's standard field kitchen, however, he will have to cope with several problems. For example, the equipment found in a standard field kitchen is too awkward and clumsy to move in deep snow. Furthermore, though the water requirement is great, resupply of water is very difficult. Shelter presents still another problem. The tent issued for the kitchen is unsatisfactory because vapor given off by cooking forms ice on the inside walls and ceiling, making the tent difficult to move. Other tents are too small or fail to meet other needs for cold weather operation of a field kitchen.

Because of the requirement for dispersion on the nuclear battlefield, ample tentage cannot be placed close enough to the central feeding area to provide all the troops a warm shelter in which to eat. On the other hand, having hot meals delivered by carrying parties is too time-consuming, not to mention the difficulties encountered in wheeled vehicle movement in weather of this extreme type. To move the kitchen around would require the use of a valuable tracked vehicle needed for other important tasks.

These are but a few of the problems in using the standard field kitchen under conditions of extreme cold. A commander who does not want to revert to the easiest way of field feeding, "C" rations or 5-in-1 "squad" rations, must devise another feeding plan. Needed is a plan less troublesome than the field kitchen, yet one that lets the men enjoy a well-prepared class "A" meal.

Such a plan was developed and field tested for three years by a rifle company in Alaska. Results showed that in subzero weather a unit can, and should, be fed hot "A" rations. This feeding plan is called "Platoon Kitchen."

Essentially, the plan requires one cook, the utensil section of a platoon-size Army stove (known as Cooking Outfit, Field), and two squad burners with fuel. (Components for the Cooking Outfit are listed in SM 10-4-7360-A15, 29 Oct 57.) The cook also needs a Yukon stove and a ten-man tent. These are found in all rifle platoons in Alaska.

This equipment, the best that the Army has thus far developed for the purpose, still presents some problems, mainly with the Cooking Outfit. This is a 123-pound, two-part stove, complete with cooking pots, utensils, and fire units. The compact utensil part was found to be satisfactory. The fire unit is unsatisfactory, however, because it does not radiate enough heat to warm a tent in subzero weather. It requires venting and, therefore, cannot be used in conjunction with a heating stove. It only burns liquid fuel, and temperatures on the cooking surface vary excessively. For these reasons, platoons use only the utensil part, which weighs less than 50 pounds and is very easy to handle.

With this equipment, a cook can prepare operational "5-in-1," "A" or "B" rations for a platoon-size unit. There are five kitchens, one for each platoon and one for company headquarters, each operating independently. The company mess sergeant is responsible for breakdown and issue of all rations daily, so that the burden of transporting and storing them is not passed on to the platoon. The next day's rations are kept in the company trains, where a ten-man tent with Yukon stove is provided for storage.

Using the gas-burning Yukon stove, and the two squad burners with improvised racks to elevate cooking pots above the flame, the cook can prepare a meal in one and one-half hours. The time could be decreased by about one-third through the use of a heat-controlled stove (such as a commercial camping stove) instead of squad burners. Feeding time for the platoon varies. Usually fifty per cent will eat while the remainder stays in position. Staggered in this manner, feeding requires about forty-five minutes. To prevent the meals from freezing, the men should be permitted to eat in the kitchen tent or other nearby shelter. It is also advisable to use paper plates, an issue item in Alaska. Food stays much warmer than on metal mess gear, and the platoon will usually have insufficient water for washing mess gear.

The platoon kitchen system works very well in stationary situations. However, when a platoon is on the move, the meal will usually have to be "C" rations. Nevertheless, the system should be used whenever possible, for the advantages of this feeding plan are many. Morale is high when the men know they will have a hot meal. Water consumption for the company is reduced by seventy-five percent. Men are not on KP, as the cook performs these duties. About the only major disadvantage is the difficulty

Continued on page 63

Radar for the ROAD Battalion

Maj William A. Brown, Inf

(Although this material was written for the ROAD Infantry, Airborne Infantry, and Mechanized Infantry Battalion, the employment of radar equipment is also generally applicable to the battle group organization. Ed.)

Each Infantry, airborne Infantry, and mechanized Infantry battalion has an excellent ground surveillance radar capability. The battalion ground surveillance section of the headquarters and headquarters company has two radar teams, each of which is equipped with a medium-range (AN/TPS-33) radar set. In each rifle company—and this is a major change—there is a ground surveillance section with two radar teams, each of which is equipped with the short-range (AN/PPS-4) radar set. An examination of the characteristics and employment of these radar teams and their equipment brings out some impressive capabilities. For example, radar teams can perform the following tactical functions:

- Search enemy defensive positions, avenues of approach, possible enemy attack positions, assembly areas, or other sectors or areas on a time schedule, at random times, or continuously to report location, size, composition, and nature of enemy activity.
- Monitor point-targets such as bridges, defiles, or road junctions, and report quantity, type of target, and direction of movement through the point.
- Assist in the adjustment of artillery and mortar fire.
- Survey final protective fire areas or barrage locations to permit timely firing.
- Survey areas of nuclear and non-nuclear fires to detect enemy activity immediately after firing as an indication of firing effect. By surveying the periphery of nuclear effects and comparing this with previous surveillance, it may be possible to ascertain the extent and types of damage (such as tree blowdown) and thereby determine whether further neutralization is required.
- Extend the observation capabilities of patrols by enabling them to survey distant points or areas of interest.
- Assist observation by units during daylight by making initial detection of partially obscured (by haze) targets at long ranges.
- Assist in the control of units during a night attack.
- Vector patrols or other units through barriers.
- Communicate with adjacent units or patrols when radio silence is imposed. The use of surveillance radar in this task, as well as those two outlined immediately above, may be accomplished when positive means of identification and appropriate signals have been established in advance.
- Determine the range to distant terrain features.
- Increase the effectiveness of fire support. When a target is detected with reasonable certainty, it may be fired upon immediately. However, if the type of target is not definitely established, the radar team can furnish range and azimuth information so that accurate illumination may establish which type of fire to use. Since radar can accurately detect the density of enemy activity in a given area, as well as the rate of advance or withdrawal, this equipment may be used in determining the optimum time for employment of explosives, atomic demolition munitions, chemicals, or destructive fires.

General Employment of Radar Equipment

Radar equipment provides the battalion with an added all-weather capability for battlefield surveillance. Its use is closely coordinated with the employment of patrols, listening posts, observation posts, and with infrared and other sensory devices. Ground surveillance radar can provide observation from a given vantage point 24 hours a day, and can detect targets and provide a much more accurate range and azimuth reading than is possible by eye. By using this all-weather, 24-hour capability, the Infantry commander can appreciably increase the effective use of fire support means.

While the radar equipment is an excellent means of obtaining information, it does not replace other surveillance means. Its primary advantage lies in its ability to complement these other means and to detect information with accuracy when other surveillance means cannot detect the same information. Although radar is used primarily for operations at night, or under conditions of poor visibility (haze, fog, smoke, etc) the equipment may also be used effectively during daylight. Its employment should not be restricted to a certain type of terrain, a rigid set of conditions, or to a few functional operations.

Capabilities of Medium Range Equipment

The medium range radar set AN/TPS-33 is a lightweight, manportable radar capable of searching for, detecting, and identifying moving ground targets within a radius of approximately 90 to 17,275 meters. Moving targets are detected by means of the Doppler effect, which is a varying pulse-to-pulse relationship of echoes re-

Simulated tactical employment of medium-range radar set AN/TPS-33. Camouflage and distances are intentionally reduced to emphasize relationship of components.

ceived simultaneously from a moving target and stationary objects near the target.

Power for the radar set is provided by a 28-volt DC gasoline engine generator which is mounted in an acoustical case to suppress noise and inhibit detection. On a quiet night, when the generator is dug in or placed behind a hill, its noise cannot be heard beyond approximately 50 meters. However, adequate ventilation must be provided for the generator.

The radar team can place the set in operation within 15 minutes, and have it out of action, ready to move, within 10 minutes. To attain desired efficiency of operation, operators should alternate every 30 minutes. The cabling system of the AN/TPS-33 permits installation of the radar 100 feet from the generator. The control indicator and "A" scope can be emplaced to allow remote control of the radar up to a distance of 150 feet. This allows operators to provide more dispersion, cover, and concealment for their position.

Visibility, terrain, and weather have no significant effect on the range capabilities of the radar set. However, rain and wind may cause an increase in background noise which makes detection of single personnel targets more difficult. The approximate range capabilities (in meters) of the AN/TPS-33 are as indicated below:

Target	Maximum	Reliable
Crawling man	3000	1600
Walking man	6500	4420
Walking squad	6500	6500
Running squad	14,000	7820
Moving ¼-ton truck	17,275	17,275
Moving 2½-ton truck	17,275	17,275

Capabilities of Short Range Equipment

The radar set AN/PPS-4 is a lightweight, man-portable, partially transistorized radar capable of searching for, detecting, and identifying moving ground targets such as personnel and vehicles within a radius of approximately 80 to 7800 meters. It is also capable of detecting certain large stationary features such as tanks and buildings. Moving targets are detected by means of the Doppler effect mentioned above. Target detection is made possible by monitoring the pulse returns of the target within a movable electronic "range gate." Moving targets and certain stationary features within this "range gate" produce a characteristic audio tone in the operator's headset and a deflection in the range extension meter needle. When a target is detected, information on range, azimuth, and elevation of the target is shown on the equipment. If the radar is properly oriented, the operator can read this information directly from his equipment.

Power for the radar set is provided by a 24-volt DC source (battery or generator). The generator is mounted in an acoustical case which effectively suppresses noise and inhibits detection. If absolute silence is required, batteries may be used.

One man can place the radar in operation within 10 minutes, and can have it out of operation, ready to move, within five minutes. For maximum efficiency, operators should alternate every 30 minutes.

Visibility, terrain, and weather have no significant effect on the range capabilities of the radar set as long as a line of sight exists between the radar set and the target. However, rain and wind may cause an increase in background noise. The range capabilities (in meters) of the AN/PPS-4 are as indicated below:

Target	Maximum	Reliable
Man crawling	2230	1300
Man walking or running	4400	3500
4 or 5 men walking	4400	3700
4 or 5 men running	7800	4400
Moving ¼-ton vehicle	7800	7800
Moving 2½-ton vehicle	7800	7800

Selection of Radar Sites

The specific location of the radar equipment site is designated by the section sergeant or, in the case of attachment or direct support, by the senior radar operator. This site must be within the general location designated by the appropriate commander, and should have as many of the following characteristics as possible:

- Permit maximum radar coverage of the assigned area.

Simulated tactical employment of short-range radar set AN/PPS-4.

- Provide concealment for the team vehicle and equipment.
- Facilitate communication with the required unit or agencies.
- Take advantage of security provided by other units while avoiding interference with their operations. If possible, a position should be selected within a well established defense perimeter; however, since the enemy may be capable of detecting radar signals and firing in that area, locating equipment close to troop dispositions or key installations may not be desirable. In each case, the considerations of METT (mission, enemy, terrain and weather, and troops available) must be weighed in positioning radar equipment.

Positioning of Radar Equipment

Radars are normally positioned on dominating terrain. A radar site and observation post may be located together; however, radar personnel should not be detailed as ground observers except in emergencies. To take advantage of the maximum range of the set, it is employed as far forward as possible, and is dug in and camouflaged consistent with the requirements for operating the equipment. In addition, the remote control operation (AN/TPS-33 only) is used whenever practicable. Radar equipment is positioned so that its employment is closely tied in with the disposition and employment of other surveillance means and and agencies.

Radar is located in areas relatively free of close ground clutter (such as trees, bushes, or buildings) which tend to distort the radar beam and results in inaccurate range, azimuth, and resulting map elevation data.

Orientation of the Radar Set

After the site is occupied, the radar set is immediately oriented and placed in operation. Then the site is improved, and a radar surveillance card is prepared if time permits. The set must be oriented in azimuth and range, and its position plotted on a map, before the operator can pin-point targets geographically. Orientation may be accomplished by inspection, resection, or intersection, much as a soldier would orient himself on a map.

By a proper orientation of the set, and by coordination with fire support elements, moving targets detected by radar can be taken under fire by fire support elements using pre-planned concentrations. Orientation and coordination of surveillance areas will be accomplished during daylight hours when feasible. In some instances, however, it may be more desirable to move radars into previously prepared positions under protection of darkness or poor visibility.

Operation of Equipment

Each radar team is assigned a specific area of surveillance. In assigning sectors, consideration is given to terrain, enemy capabilities, equipment capabilities, and desired degree of sector overlap. Sector surveillance assignments, the type of surveillance to be conducted (scan, search, or monitor), how and when the information is to be reported, and frequency of coverage must be included in the instructions to the radar team. The technique of scanning an area by radar is generally comparable to the scanning technique of a ground observer.

If enemy activity is detected in an area not included in the surveillance plan, a new mission may be prescribed. When such a mission is completed, the operator returns to the prescribed area of surveillance. Radar should be operated at irregular intervals to provide some security from detection and subsequent jamming by the enemy.

Reporting Information

Ground radar surveillance reporting procedures should be in the unit SOP. Depending upon the specific requirements, both negative and positive information will be reported by the operator immediately or at prescribed intervals. The operator will transmit information by coordinates, distance from a known reference point, or by range and azimuth of the activity located, and will state what he determines the target to be (dismounted personnel, wheeled or tracked vehicles, etc). Specific reporting details will be prescribed by the commander assigning the surveillance mission. The requirement for immediate reporting of enemy activity must be stressed at all echelons.

Employment in the Offense

Radar teams may be profitably employed in a penetration or envelopment. In a penetration they may locate enemy defenses so that

the attacking commander can avoid enemy strengths and capitalize on enemy defensive weaknesses discovered by radar and other surveillance means. Gaps between enemy units may be detected and assailable flanks located. In the conduct of an envelopment, radar teams may be used to detect enemy forces which have been diverted to meet the threat of the enveloping force.

Infiltration

When gaps in enemy defenses have been located, the attacking force may infiltrate through the enemy position. Radar teams may be profitably used in conjunction with infiltration by surveying infiltration lanes for enemy activity and determining progress of infiltrating units. When radio silence is necessary, radar may be used to determine time of passage through phase lines or check points.

Actions During the Attack

Once contact has been established, radar teams may be used to (1) provide surveillance forward of the line of contact or on an exposed flank; (2) provide surveillance over critical areas or avenues of approach into the zone of attack; (3) locate enemy activity to facilitate use of preparatory fires; (4) survey enemy positions in order to establish whether any reinforcement, shifting, or withdrawal of enemy units is effected after the attack has begun; and (5) help determine the result of effects after nuclear fires.

During darkness or poor visibility, radar may be used as a means of vectoring or guiding friendly attacking elements. They can trace the movement of forward friendly units to establish or confirm their specific location at any time and to coordinate supporting fires with the advance of those elements. To help locate friendly elements, a pattern of signals may be established to assist the operator in identification. This may consist of swinging a canteen or helmet in rotary fashion, using a corner reflector (issued with the set), or using any pattern of movement which can be readily identified by the operator. When other means of communication fail, and pyrotechnics are not visible, coded signals may be sent to radar teams to request lifting or shifting supporting fires.

Radar teams should be kept as far forward as the tactical situation and terrain will permit. Teams displace to support a continuation of the attack when they can no longer provide effective support. Displacement may also be required to support consolidation on the objectives.

Actions During Defensive Operations

In the defense, the surveillance effort is directed not only forward of the FEBA, but also in depth throughout the battle area. Particular attention is given to gaps between units, to exposed flanks, to possible helicopter landing sites or parachute drop zones, and other critical areas. Alternate and supplementary positions for radar teams are established to provide complete surveillance coverage of the battle area.

Radar teams may support any one, or any combination, of the three echelons of defense. Teams may be employed with security echelons (GOP, COP, etc) to extend surveillance capability. (These teams normally revert to their primary mission when the security echelon is withdrawn. They may be used in conjunction with barrages and final protective fires by determining when enemy strength is located in these areas. Radars may be used to determine when emplaced Claymore anti-personnel weapons can best be detonated. They may be used to determine the optimum time for detonating explosives, chemicals, or atomic demolition munitions.

Since the enemy may often attack at night, during poor visibility, or with heavy smoke screens, radar will be of great use in defensive operations. When an enemy attack is made on a broad front, the amount of his activity in a given area may indicate the location of his main effort. When radar sightings are related to knowledge of enemy tactics, specific enemy maneuvers may be anticipated. Radar sightings may establish the depth of the enemy offensive effort and indicate whether a feint or demonstration is being conducted.

Patrols and Ambushes

Plans for use of radar are coordinated with patrol plans to enable the radar operators to distinguish between movement of friendly elements and enemy infiltration. To assist in identification, a set of signals may be established for the specific action. Patrols may also send messages to the radar team by use of a corner reflector.

When a radar team surveys an area in which friendly patrols are operating, it may locate enemy activity which could be detrimental to the friendly patrol. A radio message or pyrotechnic signal to the patrol may direct the patrol to avoid the discovered enemy activity, or may vector it toward the activity.

Radar may locate enemy patrols moving toward friendly positions, and thus allow friendly units to ambush those patrols and take prisoners.

Action During A Counterattack

During a counterattack, radar teams continue to report information of enemy activity. By prior arrangement, teams located to the rear may be used to establish precise locations of friendly units on the periphery of an enemy penetration. This information may be a critical element in the counterattack, particularly when nuclear fires are to be employed. Radar may help furnish information on the strength and depth of the enemy penetration. Teams used with companies in or adjacent to an enemy penetration may shift their areas of surveillance (on order) to the penetration to provide the commander with information.

It is obvious that radar equipment adds an impressive capability to the Infantry, airborne Infantry, and mechanized Infantry battalion. It is equally apparent that the extent of this radar capability, and the effectiveness of the ground surveillance section, will be limited only by the imagination and ingenuity of the Infantry commander.

(This material is contained in draft FMs 7-11 and 7-20 now pending approval. Ed)

COLD WEATHER INJURIES

Lt Col George T. Britton, MC

COLD HAS plagued armies of the world during practically all of recorded history. Hippocrates, Aristotle, and Galen wrote of cold injury; the armies of Alexander and Xenophon suffered from it. Greek armies in the fourth century BC reported it. More recent records are even more dramatic: the Napoleonic Wars, the Crimean War, the Civil War, the Franco-Prussian War, the Russo-Japanese War, and the Balkan Wars of 1912. And within the memory of many of today's Infantrymen, there are the vivid accounts of cold injury in World War I, the Spanish Civil War, World War II, and in Korea.

Unfortunately, armies have profited little from lessons of the past. The British did not build on their experience of the Crimean War, with the result that the winter of 1914-1915 took its great toll with cold-injury casualties. US forces entering World War I took advantage of the experience of their Allies to the extent that only 2061 hospital admissions for trench foot were recorded, but procedures penciled into the US notebooks were not carried over to World War II. In World War II, experiences of the Aleutian operations were not used as a guide for winter operations in Italy in 1943-1944; and the lessons of Italy were not used in planning and training for the invasion of Europe, where there were approximately 71,000 casualties, with an average hospitalization of almost 50 days each. In Korea, US forces suffered 9000 cold-injury casualties during the winter of 1950-1951 alone.

With cold injury, not only are large numbers of troops affected and long hospitalization required, but those victims who get by without permanent crippling are more susceptible to recurrence; often they cannot be used in the MOS for which they have been trained.

Cold injury has been given many names: freezing, frostbite, water bite, footbite, cold bite, puttee bite, trench bite, chilled feet, immersion foot, shelter leg, trench foot, etc. In general, however, the injury is nearly the same in each case. From a military standpoint, even the two principal conditions, trench foot and frostbite, are differentiated primarily by the recorded temperature.

In frostbite, the flesh of the affected part of the body crystallizes into ice, usually at temperatures below 20° F. It is only after thawing that the full extent of the injury becomes apparent, with pain, swelling, leaking of certain blood vessels—and, quite commonly, gangrene.

Trench foot, a more subtle form of cold injury, is the more common. It can occur in any part of the world where persons may be exposed for several hours to temperatures below 50° F. In such temperatures, as the body begins to lose heat, there is an automatic constriction in blood vessels of the arms and legs, with a corresponding reduction in blood flow to these parts. The greatest effect is seen in the feet (being far from the heart), where the reduced circulation is not enough to keep the flesh warm, alive, and healthy.

As trench foot develops, the body feels cold all over; the feet first

"The commanding officer should take the utmost care never to suffer a soldier to sleep, or even to sit down, in his tent with wet clothes. . . . The utmost vigilance will be necessary to guard against this fruitful source of diseases among soldiers." Benjamin Rush, Physician General during the Revolutionary War.

". . . The most serious menace confronting us today is not the German Army . . . but the weather which, if we do not exert ourselves, may well destroy us through the incidence of trench foot." Lt. General George S. Patton, Jr., Commanding General, Third US Army (1944).

become cold, and later red and painful. The pain often is described as throbbing, tingling, lancing, or cramping. After a number of minutes, perhaps an hour, the pain disappears and the feet become pale and numb, often described as "heavy" or "wooden." And then the feet swell, with a characteristic waxy appearance. When the feet are re-warmed, by putting them against the other leg or into a buddy's armpit, there is a reversal of symptoms. The tingling, lancing-like pain returns, the color often changes to blue or purple, and blisters may form on the swollen foot.

Although the individual and the Army Medical Service must assume partial responsibility, the prevention of trench foot has always been the commander's problem. This was established in World War I by General Order No. 11, General Headquarters, AEF, 17 January 1918, which made commanders of all units personally responsible. The routine practice of having squad leaders inspect the feet of their squads was started in this war. The commander's role was restated during WW II, in War Department Circular No. 312, dated 22 July 1944. Well-led units always had the lowest records for cold injury.

Commanders in our Allies' armies were similarly responsible. However, our Allies never suffered severely with cold injury during WW II, perhaps because of their origins in colder climates, and because of their habits of walking. They were more accustomed to adjusting to cold weather, and more skilled in caring for their feet. On the other hand, the heated-car-riding American citizen was not experienced with cold. Many US officers, including doctors, had never seen cold injury and had no idea how to control it.

The essential elements of prevention at the unit level are well established: (1) provision of ample supplies of clothing and footgear which are properly sized, well fitted, correctly worn, and always readily available; (2) maintenance of good foot discipline and good clothing discipline; and (3) rotation of individuals within their unit, and the rotation of whole units out of the forward foxholes.

At the individual level, the cardinal principles of trench foot prevention are these:

- Don't stand or sit with feet in cold water. The body can't compete with the chilling effects of cold water on feet or legs. Try to keep the feet out of water, or dig a sump to drain away the water.
- Keep the feet moving. Marking time, tapping, wiggling, bending—all these muscular movements massage veins in feet and legs and improve blood circulation.
- Take off boots frequently to massage the feet. This helps local circulation, and affords a chance to inspect the feet for signs of injury.
- Cut down on smoking. Nicotine causes dangerous *additional* constriction of blood vessels in feet and legs.
- Dress warmly. Warmth of the entire body encourages enlargement of blood vessels in arms and legs. Turn down ear flaps of the field cap, under the helmet; keep dry wool inserts in gloves; use the layer principle, zipping or buttoning up all garments. Wearing extra layers across the back of the shoulders, where the weight of clothing often falls, is particularly comfortable in cold weather.
- Maintain the insulation of your clothing. If you have been issued black rubber combat boots ("thermal boots"), the insulation is provided in their construction. If you have only leather combat boots, or perhaps snowpacs, the insulation depends upon dry socks. Change to dry socks (and, where indicated, dry insoles) whenever the ones you are wearing become wet (whether from rain, snow, from wading through water, or from normal perspiration of the feet).

Once the feet have become cold and painful (or numb), the most effective first aid consists of rapid warming by body temperature. *Do not rub with snow,* as recommended by Baron Larrey, surgeon to the French armies in the Napoleonic Wars. This treatment has long been disproved, but the legend lingers on among many groups.

Rapid warming usually is best accomplished by placing the cold foot against a warm part of the body. Do not use warmer heat, such as a fire, a stove, or hot water. The hazard of actual heat burns during this time is great. If, after complete rewarming, there is no pain and no remaining color change, put your boots back on and continue assigned duties. If there is remaining pain, or if the color does not seem to return to normal, go to an aidman for evaluation. You should be carried—not allowed to walk—to the aid station.

Above all, remember this: Cold injury is preventable. Don't let it develop in your unit.

New Roles for

Fallout Prediction Drone

Maj Joseph J. Ondishko Jr, Inf

THERE is equipment available and in use which, when properly used in concert, will enable a battlefield commander to obtain lighting-like fallout information. The expeditious use of this information will reduce the potential panic caused by radiological fallout, and more important, it will save lives.

Available now are the following items: the jet drone (or rocket-powered target missile RP-76), radar, radiation-sensitive devices, area communication systems, automatic data processing systems, and facsimile devices. When used together, these items provide the commander with a means of making immediate and thorough fallout analysis on a scale never before thought possible.

Consider this hypothetical situation. An Infantry Division is on the defensive. Superimposed on the defensive scheme is the area communications system (ACS), which links together all the major organic and attached units and higher headquarters. Organic radar is operational, and so also is an automatic data processing system (ADPS).

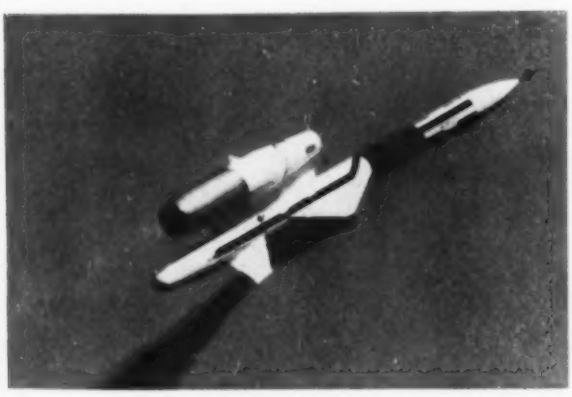
During the course of active defense, assume that a nuclear weapon has burst on the FEBA at the juncture of two battle groups. This is a surface burst of reasonably high yield, and there is no doubt that fallout will occur. Wind direction is generally into the division's area, and it may be assumed that at least a portion of the unit is in jeopardy. But how extensive will fallout be? How dangerous is it to the entire command? How can it be effectively combated? The answers to these questions can be provided almost at once by a properly equipped drone.

The sophisticated drone, which is carrying radiation sensory equipment and transmitters, is launched and is guided by radar to the vicinity of ground zero. At varying altitudes, radiation intensities are obtained and transmitted to the Division Radiological Center. Simultaneously, the location and altitude of the drone are being transmitted to the Center by the radar which controls and tracks it. Other means have been used to secure the wind data needed, and these, too, are being received at the Center.

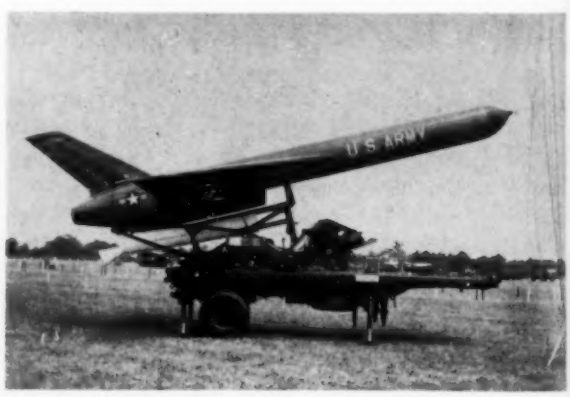
As these raw data are received, they are rapidly integrated into the ADPS and are converted into a single, homogeneous, fallout contour map such as the weather bureau now uses. Via facsimile machinery, this fallout contour map is then transmitted simultaneously to all major subordinate and adjacent units, and to higher headquarters, over the area communications system.

The procedure is virtually automatic and instantaneous. Meniality, drudgery, and tedium are gone. Gone also are the fears, anxieties, and needless risks to personnel. Response to this system would not only be spontaneous, but would also become routine and commonplace, for the uncertainties concerning fallout would be rapidly and accurately resolved.

To be sure, not all of the equipment cited is yet organic to the units used in the example. But it is available to them. Why shouldn't it be used to great advantage?



RP76 Supersonic Target Missile.



AN/USD5 Surveillance Drone.

the Drone

Antitank Drone

Capt Henry J. Stein Jr, Inf

To PLUG a charging rhinoceros, the hunter aims for a spot right between the eyes. When hunting tanks, the Infantryman should fire at his prey's most vulnerable spot. Because of the tank's restricted visibility to its rear and flanks, antitank teams try to attack from those directions. If the first round fired is not a kill, the team may not be able to fire another round before the tank turns. Even if a kill is made on the first round, there may be other tanks to confront the attacker with devastating fires.

The ideal antitank weapon would allow the user to strike the tank in a vulnerable spot, and yet thoroughly conceal the source of attack. The only antitank weapon in our inventory approaching this capability is the SS10, whose gunner may be 100 meters away from the firing point. However, this does not eliminate the gunner's vulnerability to attack by the tank; it merely shifts his location.

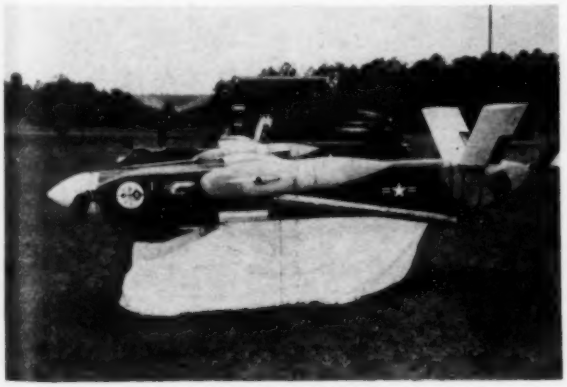
These weaknesses can be overcome. We have weapon and surveillance systems in stockpile or under development which, if properly assembled and modified, would give a 360-degree tank-killing capability. Furthermore, tank-killing range would no longer be measured in yards or meters, but in miles. Chief among these weapons is the AN/USD-1 drone. It is capable of radio-controlled flight, speeds of 180 mph, and a flight duration of 30 minutes. Other drone systems in the development stage outperform the AN/USD-1.

By adding certain components to present drone systems, we can make the tank-killing drone a reality. These components include a transistorized television camera with a wide-angle lens, a single-stage, solid-fuel antitank rocket, and a television screen for the gunner to see a picture transmitted by the drone. Line-of-sight transmission requirements can be met by relaying transmission through another drone or aircraft. Additional flexibility could be obtained by launching the drone from a mother aircraft which also contains the gunner and flight controls.

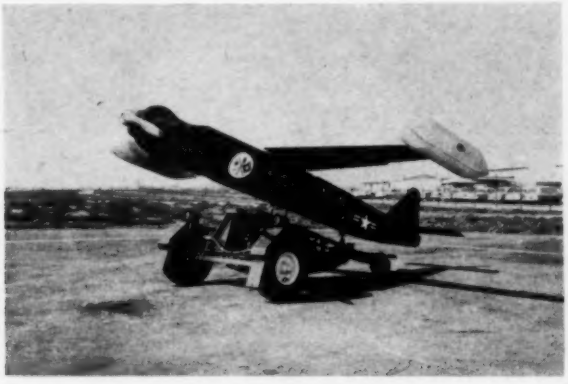
The antitank gunner, looking at his TV screen, sees the same sight picture as an aviator flying an aircraft. Sight reference data recorded on the face of the screen (just as on the lens of an antitank gun sight) would allow the gunner to aim and fire the rocket. An altimeter and compass mounted in the drone, reflecting readings on the screen, would facilitate flight control. Flight attitude and orientation would be made in reference to the horizon, terrain features, and landmarks, as seen on the screen and cross-checked on a navigational chart.

Additional advantages of the tank-killing drone are unlimited. For example, personnel facing in the direction of a nuclear explosion are blinded for an appropriate time. The antitank gunner, looking into his TV screen during the blast, would see the flash with only the maximum candlepower of the television tube. Consequently, he would not be blinded and would be able to destroy enemy armor exploiting the effects of the blast.

Development of the 360-degree tank-killing drone is a challenge to the Army and to American industry. If this challenge is resolved, the term "shock action" may well be used by enemy tankers to describe their response to the tank-killing drone.



AN/USD2 Drone.



AN/USDI R-CAT.

LEADERS REACTION COURSE

Capt John J. Morrissey, Inf

The six-man patrol is busily engaged in accomplishing its mission—to deliver urgently needed ammunition to a gun position on the far side of a fast-moving river. Since the gun is to furnish support for an attack in fifteen minutes, the patrol has only that amount of time to complete its mission. There exists a double line of partially destroyed pilings spanning the river, and the patrol is laying a series of heavy planks in an attempt to effect a crossing. The sporadic mortar fire which is pounding the water around it. The leader has had the ammunition placed in a handcart he commandeered from a nearby barnyard. Two men are laying planks along one line of pilings, while the leader and another man lay planks along the other line of pilings. The remaining two men are moving the cart closer to the crossing site.

The obvious attempt is to allow each set of planks to support one of the cart's two wheels. All planks are in position before the leader finds that there are not enough planks to span the river, and, as the cart is brought closer to the double-track bridge, he learns also that the cart's wheel base is not wide enough for the double line of planks. He next directs his men to place a long log through the spokes of both wheels, thereby allowing the cart to be supported by the double track, and the men slide the cart across. Planks are taken up as the cart passes beyond them and relaid ahead of the cart to let it complete the crossing. The patrol has the cart five feet from the far bank when the attack jumps off. The patrol failed to accomplish its mission.

This incident did not occur on some far-flung battlefield of the world. Actually, it is Task #7 on the Infantry School's Leaders Reaction Course. But the participants, students in the Infantry Officer Candidate School, know that someday they may well be involved in an actual combat situation requiring an even greater degree of leadership ability.

In the situation described, the patrol failed to accomplish its mission for a number of reasons. The leader did not correctly estimate the situation, taking into consideration the nature of the task at hand, the time available, and the equipment provided. The plan he devised, if there was one, obviously was not based on good judgment. Also, the leader lost sight of the time by becoming involved in the details of the operation rather than delegating the work and supervising the operation. If the leader's judgment were not faulty, he would have directed that four of the six available planks

On task #7, a thorough estimate of the situation is essential.

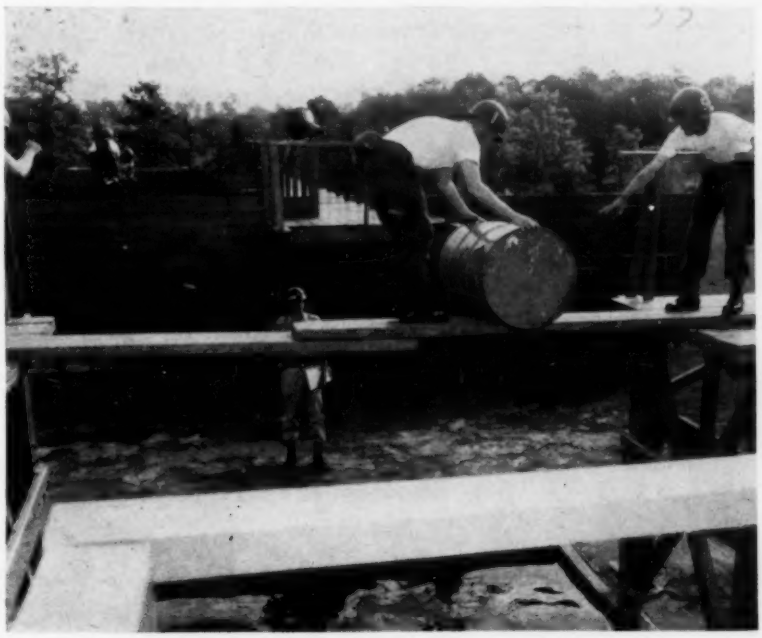
The compactness of the course permits easy control.

be laid on only one line of pilings, and that the cart be handcarried or dragged across the planks by two of the stronger men in his patrol. The cart is not so heavy as to preclude this solution to the problem. Like the fifteen other tasks on the course, this task demanded sound judgment, decisiveness, initiative and other traits required of the combat leader, training vitally important in the development of potential leaders.

The Infantry School employs many varied techniques to develop junior leaders, but the Leaders Reaction Course is the most concentrated and effective method yet devised. The purpose of the course is to assist the individual student in becoming an effective Infantry leader. Through his participation on the course as a team leader, he has the opportunity to improve his leadership ability in four ways: accepting constructive criticism of his peers; observing reaction of his teammates to orders and directions; accepting advice offered by the rating officer; and making an honest self-analysis. Self-analysis is indispensable to self-improvement. Knowing one's strengths and weaknesses, possessing average intelligence, and having a strong desire to become a leader are the basic ingredients necessary for good leadership.

The Infantry School firmly believes that leadership is an art which can be learned and mastered. It is true that men are born with certain basic abilities, but these abilities do not apply to any specific field of endeavor. The man who aspires to leadership must develop the type of character and personality which will enable him to obtain the willing obedience, confidence, respect and loyal cooperation of his men.

The sixteen tasks on the Leaders Reaction Course are designed to allow the student to use the principles of leadership which he learned in the classroom. The principles of leadership have stood the test of time and have guided the actions of outstanding commanders throughout our military history. In addition, the traits of a leader have similarly enabled these commanders to effectively communicate with their men. The young leader is encouraged to develop these traits to as high a degree as possible so he can elicit loyalty, respect, and confidence from his followers. His participation on the course brings the traits of his personality into sharper focus so that their strength or weakness can be detected.



Task #1 requires both physical courage and confidence in one's fellow team members.

The course is normally conducted in two phases: the practical phase, which is conducted outdoors on the course itself; and the counseling phase, which is conducted indoors as soon after the practical phase as scheduling will permit. During the practical phase, the class is divided into twelve-man groups. An experienced commissioned officer, who is a qualified observer, is appointed as the rating officer for each group. The principal instructor directs each rating officer to move his group to its starting task. Before work begins, however, the rating officer further divides his twelve-man group into two teams of six men each. One team will work on the initial task while the other observes, and on the next task the teams will reverse positions. They continue to alternate positions on subsequent tasks during the four-hour practical phase.

Fifteen minutes are allotted for the accomplishment of each task. When time has elapsed, whether or not the task was successfully completed, all work stops and the rating officer directs the observer team to critique the performance of the working team. While the working team was attempting to accomplish its task, the rating officer was scrutinizing the actions of each member of the team, but in particular the appointed team leader. After a five-minute critique by the observer team, the rating officer presents additional critique points, and the group moves to the next task on the course. Comments are kept general so as not to embarrass any one individual before his contemporaries.

The rating officer is the key to effectiveness of the course. He must be constantly alert to the actions and statements of the team members as they work if he is to learn which traits are dominant and which are recessive in the personalities of the participants. He must be alert to detect weaknesses or strengths in the techniques used by the leader to obtain desired results.

Using a scale model, rating officers point out the students' strengths and weaknesses.

The counseling phase takes place in privacy. Information gained by the rating officer during the practical phase is used to point out areas in which the student is weak or strong, and to recommend methods of improvement. The student is given an appraisal of his personality based on the traits of a leader as indicated by his performance during the practical phase. He is told that the techniques of self-analysis must continue throughout his career if he is to be successful. For no matter how often he is justly criticized, or by whom, the individual must concern himself with his strengths and weaknesses if he is to improve.

Many similar courses exist in our Army today. Most of them, however, require that the participant reach a certain level of proficiency in a given skill (such as radio operation, vehicular repair, unit employment, or weapons employment) in order to do well on the course. The Infantry School's Leaders Reaction Course is unique in that it is psychological rather than technical. No specific military training is required of the participant. The implements used in accomplishing the various tasks are items usually found on the battlefield, items with which the individual has come in contact before. Since the course is basic in equipment and objectives, the students, regardless of background, are on a parity in all respects except leadership. This eliminates the variable of background or training in military subjects. It allows the rating officer to evaluate the leadership ability of the individual rather than his skill in the use of a certain item of equipment.

For the officer candidates and the junior officers who participate in the course, it provides the opportunity for them to lead men, in many cases for the first time. They actually lead their contemporaries in the accomplishment of the task, but their mistakes do not result in serious penalties as in actual command or combat. The Leaders Reaction Course provides an effective analysis of the potential leader's abilities, enabling him to know himself and seek self-improvement.

CLANDESTINE ASSEMBLY

Capt Wayne J. Prokup, Inf

It was May the fourth, 1862. Colonel John Hunt Morgan and a contingent of his Confederate "Alligator Horse" raiders had moved into the small town of Lebanon, Tennessee, to rest and re-organize after completing a grueling 170-mile penetration into Union-patrolled territory. Five days of raising havoc with General Mitchell's forces had left the troopers saddle sore and eager for a time out to rest on their laurels. Complete relaxation, coupled with wild celebrations of recent victories, was the order of the day. The officers, overconfident and somewhat "drunk" with their apparent invincibility, placed great faith in the natural security offered by the bleak, rainy weather which prevailed in the countryside that night. Pickets were posted on the main roads leading into town but they received no specific instructions. Consequently, the overall early warning system was haphazard and lacking in command supervision.

Early in the evening, the sentries—chilled by the rain and eager to join in the merrymaking—moved their posts indoors. They decided that any Federal patrol foolhardy enough to venture out on such a foul night could easily be seen through the barroom window. From a tactical standpoint, the situation invited disaster, and Colonel Frank Wolford, commander of the 1st Kentucky Union Cavalry, eagerly accepted the invitation. His column entered Lebanon a few minutes before dawn on May the fifth. What took place in and around the town for the next two hours would rival the horse opera epics of the silent movie era.

When the smoke cleared, Morgan's gray-clad cavaliers were in full flight to gain the safety offered by the friendly southern banks of the Cumberland River. What had been a proud force a few hours before was now reduced to its commander and five men. The others were killed, wounded, captured, or routed in complete bedlam to the four winds.

The battlefields of the 1860s offered the luxury of many kinds of mistakes that cannot be tolerated in modern warfare. Today, security is a continual problem that demands positive planning and action on the part of commanders at all echelons. This is especially true for a unit operating independently in enemy-controlled territory.

The long-range combat or reconnaissance patrol, in particular, is faced with the problem of keeping its presence in an area secret (except when requirements of the mission dictate a contact with the enemy). Secrecy and security during movement are provided for by proper route selection and strict adherence to the principles of discipling individual noise, light, and camouflage.

When a patrol operating behind enemy lines is required to halt, active and passive measures must be taken to provide the maximum amount of security while the patrol remains in such a vulnerable situation. The most effective means of assuring maximum security in such a situation is to move the patrol into an assembly area that, by the very nature of its remote geographic and topographic location, provides passive security from enemy detection. Such an assembly area, when situated in a locality not protected by friendly troops, is

termed a *Clandestine Assembly Area,* often abbreviated CAA.

THE activities carried out in a Clandestine Assembly Area are similar to those associated with an assembly area within friendly battle positions, except that all movement is held to an absolute minimum. The location and internal organization of the CAA require more detailed planning than an assembly area in terrain protected by friendly troops. When the nature of the operation demands an extended halt behind enemy lines, the patrol leader's plan should include *tentative* Clandestine Assembly Area locations based on a thorough map reconnaissance. These tentative locations must be confirmed by ground reconnaissance prior to occupation by the patrol.

In moving to a Clandestine Assembly Area, the patrol should travel between the hours of dusk and dawn, thus using darkness for concealment in closing into the preselected site. The patrol should cease all movement during daylight hours in order to avoid detection. Besides halting to avoid detection during daylight, the patrol will have to cease movement for awhile anyway in order to keep out of sight while the patrol leader conducts a detailed reconnaissance of the objective area. The halt also gives the patrol leader a reasonable reaction period to formulate a final plan based on his reconnaissance of the objective, and to issue necessary orders prior to actions on the objective.

Detailed planning for the occupation and establishment of the Clandestine Assembly Area begins prior to entering enemy territory. The patrol leader knows that he will be absent from the Clandestine Assembly Area shortly after the patrol's occupation, because he must conduct an objective reconnaissance. Therefore, his plans should assume that the assistant patrol leader and subordinate leaders will reorganize and supervise the squad and team elements within the patrol.

A halt after an extended movement does not mean that the patrol does nothing. Instead, with the patrol leader's planning guidance, a priority of tasks is assigned. Emphasis is placed upon posting proper security, cleaning weapons, proper foot care, personal hygiene, water resupply, feeding troops, continued planning, and, finally, rest. During the entire stay at the CAA location, the use of the chain-of-command to enforce discipline of movement, light, noise, smoke, equipment, and camouflage is of paramount importance.

The plan for a Clandestine Assembly Area should include both passive and active security measures. Passive security measures include the following:

AVOID built-up areas (humans and barking dogs lead to detection).

SELECT an area remote from all indigenous habitation.

AVOID known or suspected enemy positions, including roads and trails.

SELECT terrain which would be considered of little tactical value.

AVOID natural avenues of drift such as ridge lines, topographic crests, valleys, lakes, streams.

SELECT steep, sloping terrain, ravines or other such areas that impede foot movement.

AVOID open woods and clearings.

SELECT areas offering dense vegetation, preferably bushes and trees that spread out close to the ground.

The actual size of the area physically occupied by a patrol in a Clandestine Assembly Area is governed by the nature of the terrain, the quantity and quality of the natural concealment available in the area, and the size of the patrol. A simple rule of thumb in determining how large the area should be is this: occupy the *minimum amount* of terrain necessary to provide *maximum concealment* utilizing whatever natural cover is available.

These passive security practices must be accompanied by active security measures which should be included in planning the organization of a Clandestine Assembly Area. Establishment of an outpost system covering all likely avenues of approach into the area is most important. Outposts with a minimum of two persons each should be established in four different directions. As a guide, outposts are located to provide the primary CAA site with at least a ten-minute patrol reaction time. A radio communication net should be established with the outposts to provide early warning of the approach of enemy personnel. Alternate means of communications would be messengers, since wire might lead to early detection and cause the CAA site to be compromised.

Another important active security measure is the selection of an alternate CAA in case the location of the original site is compromised. This area should be physically reconnoitered prior to occupation to make sure it is free of enemy. A plan for withdrawal in the event of discovery should also be established. Every patrol member should know his present map location, and directional azimuth and coordinates of the alternate CAA site. An alert plan should be made whereby a certain per cent of the personnel are awake at all times—as a minimum, two persons from each squad or team.

CAREFUL organization of the CAA will permit necessary and timely activities to take place with a minimum of movement. Use of available time can be planned so that certain squads or teams are responsible for certain outposts, including timely reliefs, food preparation, and water resupply. Leaders must continue to supervise to make sure that patrol members who are prone to be "lovers of creature comfort" have conducted the assigned and important tasks first.

All of these measures, if carefully observed, will yield the maximum in security. Nothing gives absolute security, of course, and the utmost caution is still in order. One thing is certain, however. As shown in the historical incident at Lebanon, Tennessee, there can be no security "through the barroom windows." There is no easy way.

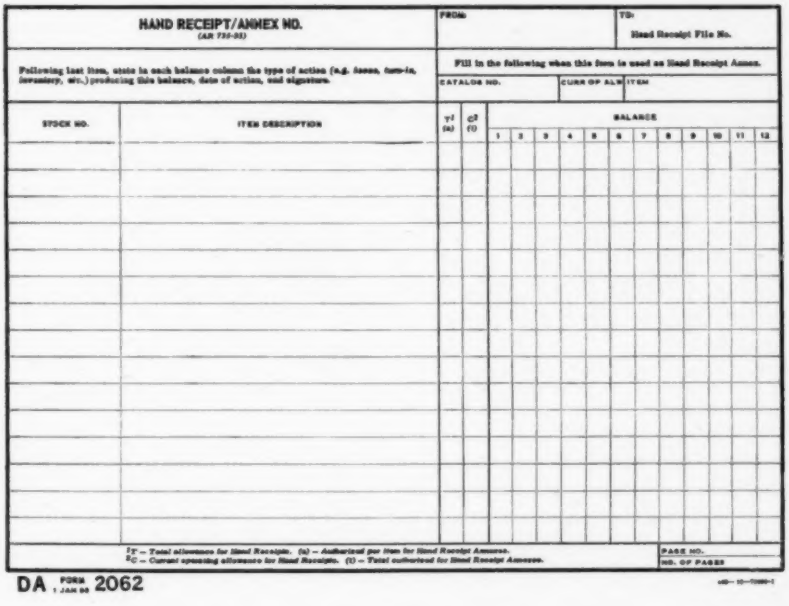
UNIT SUPPLY SYSTEM

UNDER the supply system instituted a few years ago, the individual platoon leader is held more directly responsible for the equipment issued his platoon. He is required to inventory all major items and components listed under the TOE for his platoon. In some organizations this is not too much, but in other units it may well run into amounts of several thousand dollars. Since most trial and error lessons in correct supply procedures wind up costing money, some of the basic considerations will be discussed here in an attempt to save some junior officer the price of a lesson for which other people have paid.

DA Form 2062, Hand Receipt/Annex (Figure 1), is used by the organization S4 to establish a Hand Receipt file for each platoon or section of the organization. Each major item of equipment listed in the appropriate paragraph of the TOE is listed in the file. A list of components is prepared, also on the Form 2062, for each major item of equipment having them. These lists become annexes to the hand receipt file and are kept with it. Since most items do have components, the annexes become as important as the hand receipt itself. One cannot be considered without the other. Most units list items only on the front side of the 2062s, leaving the reverse side free for signatures reflecting issues, turn-ins, and inventories.

Each person given command of a unit which has its own account is required by regulations to inventory that account within two weeks, and to indicate that he assumes the responsibility for that equipment by signing the reverse of each page of the hand receipt and annexes. If, for some reason, the inventory cannot be completed within the two weeks, permission may be granted to delay the signing. Only unusual conditions, however, will merit such consideration. Additionally, he is required to inventory and sign the hand receipt every six months. The first inventory should be a joint inventory taken with the person being relieved of the property. This will preclude any questions about whether property was or was not on hand. The person being relieved is responsible for initiating any action necessary to recover property not on hand. However, if no action has been taken within 30 days, the new account holder should initiate a Report of Survey so that he will not be held liable for this missing property.

While regulations prevent equipment from being hand receipted to a lower level, there are several means whereby the account holder can insure that the person actually using the equipment is aware of his responsibility. A notebook may be kept to list all the equipment used by a squad, and the squad leader required to initial it showing that he is aware of the equipment for which he will be held responsible. Or the platoon leader may list each squad's equipment on a separate 2062 and require the squad leader to sign it. This does not, of course, relieve the platoon leader from the account-



HAND RECEIPT/ANNEX NO.
(AR 735-35)

FROM:

TO:
Hand Receipt File No.

Following last item, state in each balance column the type of action (e.g. issue, turn-in, inventory, etc.) producing this balance, date of action, and signature.

Fill in the following when this form is used as Hand Receipt Annex.

CATALOG NO. | CLASS OF ALW | ITEM

STOCK NO.	ITEM DESCRIPTION	T/[1] (a)	C/[2] (l)	BALANCE 1	2	3	4	5	6	7	8	9	10	11	12

[1]T – Total allowance for Hand Receipt. (a) – Authorized per item for Hand Receipt Annexes.
[2]C – Current operating allowance for Hand Receipt. (l) – Total authorized for Hand Receipt Annexes.

PAGE NO.
NO. OF PAGES

DA FORM 1 JAN 64 2062

Figure 1

ability for that equipment; it only enables him to insure that the user is aware of his responsibility both to the platoon leader and the equipment.

For the inventory of *major items,* the last figure in the numbered columns of the 2062 is the number of items that should be on hand (with one exception which will be discussed later). This figure is a running balance, indicating issues or turn-ins only as they affect the total balance.

For the components this does not apply. A brief review of the system will show how they are counted. When the system was started, some few components of sets or kits had never been issued before. For all components that had been issued, the total number issued was listed in column 1. As the initial issue of the other components was made, it was posted in the numbered columns on that particular annex. As soon as all of the authorized components are issued, no further posting is done on the annexes. Remember—no turn-ins of components are posted on the annexes; only the initial issues are posted. This shows, then, that in counting components, fewer items may be found than are listed on the annex. Where are they? They either have been turned in for repair or replacement, or they are missing.

When a component is damaged or becomes unserviceable through fair wear and tear, it must be turned in for replacement. It is accompanied by two parts of a three-part tag, **DA Form 1115, Property Turn-In Tag** (Figure 2). This tag is filled out by the company supply sergeant, and the bottom portion given by him to the person turning in the item. The middle portion is retained in the company supply room, after being initialed by a representative of the S4, and the top third stays at S4 to serve as a backup for the formal requisition submitted by the

DA FORM 1115
1 DEC 67
REPLACES EDITION OF 1 JUN 64.

PROPERTY TURN-IN TAG
(AR 711-16)

1. TECHNICAL SERVICE	2. DATE	
3. UNIT OR ORG		
4. STOCK NUMBER		
5. ITEM NAME		
6. EXCHANGE	7. REPAIR	8. TURN-IN
END ITEM IDENT	9. NAME & MANUFACTURER	
	10. MODEL	11. SER NO.
12. UNIT OR ORG		
13. STOCK NO.		
14. ITEM NAME		
15. UNIT OR ORG		
16. STOCK NO.		
17. ITEM NAME		

Figure 2

S4. When the replacement item is received at S4, the middle of the tag must be surrendered by the company before the item will be issued. Likewise, the lower part of the tag will be surrendered to the supply sergeant before he will release the replacement item to the platoon. By these means, accountability for property is maintained and no one is required to surrender property without being given a receipt.

When either a major item of equipment or a component is turned in *for repair,* it is treated differently from a turn-in for replacement. A completed **DA Form 811, Work Request and Job Order,** goes with the item. The fourth copy of the form is signed by the person receiving the item and filed in the company in a Current Work Order File.

ONE MANNER of conducting a required inventory is to have a layout of every piece of equipment listed on both hand receipts and the annexes. In this way, the person conducting the inventory can both inventory and inspect the property. Then, after completing the physical inventory, the list of major items and components not on hand should be checked against the current work order file and the file of turn-in tags maintained by the company supply sergeant. Those items still not accounted for must be assumed lost. Statements of Charges or Reports of Survey are the only "honorable" ways of making up those items.

Some critical items must be safeguarded in the company arms room, by order of higher headquarters. For those items which are serially numbered and cannot lose their identity, this presents no problem. But for items such as grenade launchers and compasses, which may lose their identity, care must be exercised. Some means whereby each platoon has its own secure place in the arms room, or a card for each individual item similar to the weapon cards used, will reduce the possibility of loss of these items when they are stored in a common place.

QUARTERLY, each commander is given the opportunity to drop some small, non-expendable items from his property accounts. The Army recognizes that some unexplained losses will occur. The platoon leader must not hesitate to take advantage of this and drop those items which have been lost through no neglect. However, this means of relief from responsibility should not be extended to someone who has been negligent. The fastest way to learn is by "buying a lesson." To use this droppage, of course, a platoon leader must know exactly the status of his equipment. Only through frequent inventories and inspections will this knowledge be gained.

Some pertinent points to remember are:

• Take the advice of those who have learned the hard way—if you can't see it, don't count it.

• Do not accept an unserviceable item. It may not be unserviceable due to fair wear and tear, and someone may have to pay for the repair. Your signature says that all the equipment is on hand and in serviceable condition.

• Learn what the different items look like; refer to the numerous supply manuals to find out what each major item has as components.

• The count from the physical inventory, plus items listed on turn-in tags and in current work order files, should equal the number reflected on the hand receipt and its annexes.

• Turn to the experts, company and battle group supply personnel, for help. They will be glad to assist anyone showing interest in their field.

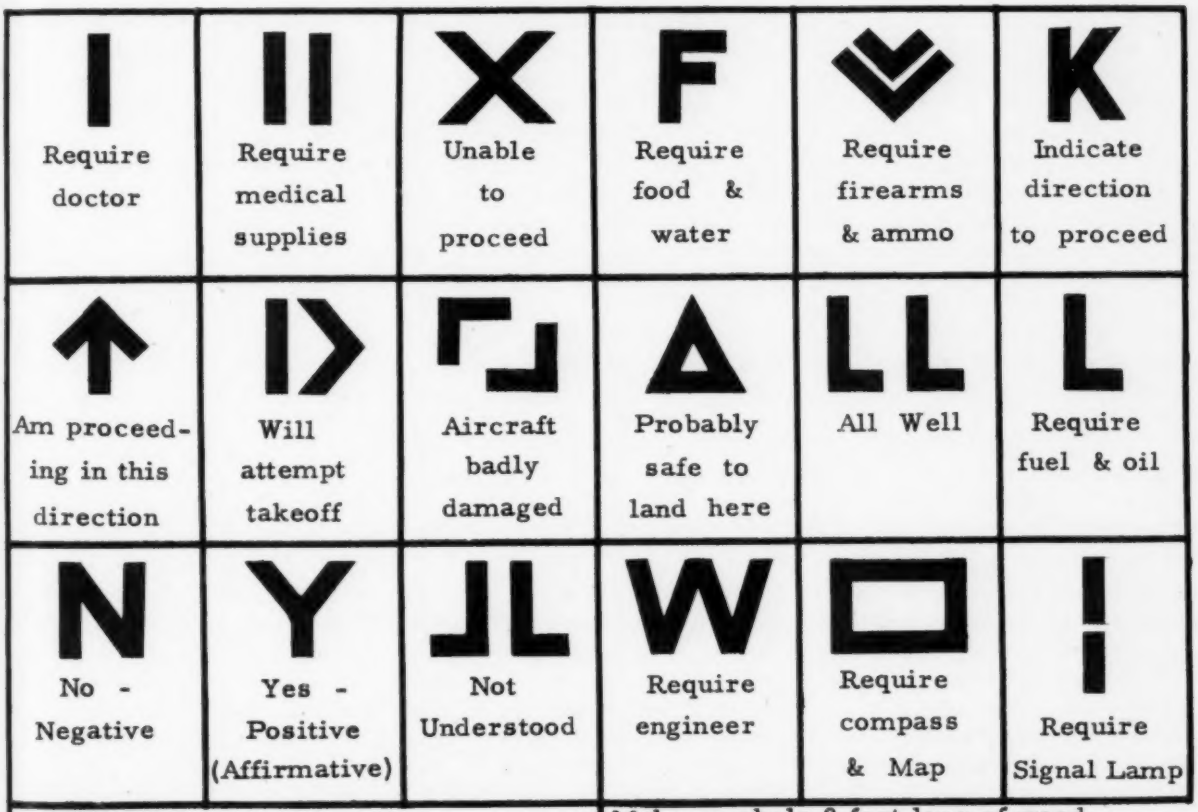
• Conduct frequent inspections and unannounced inventories of each squad's equipment to insure that the squad leader is meeting your standards. When someone other than the platoon leader will be using the equipment, waste no time insuring that he fully understands he is to maintain and safeguard that equipment. Use the quarterly droppage to assist the conscientious squad leader.

• Maintain a close understanding and good working relationship with the company supply sergeant. Since the numerous day-to-day supply activities would take too much of the platoon leader's time, he must often delegate some authority to the supply sergeant. Since the supply sergeant can sign receipts for the platoon leader, this is similar to giving the supply sergeant a signed blank check. Mutual trust and understanding must exist.

• Insure that you have a definite system of establishing the armorer's responsibility for your equipment when it is stored in the company arms room.

Realize the importance of supply economy and assist your commander in practicing it. This is *your* equipment. *You* may have to pay for it if it is lost or damaged through your neglect or the neglect of someone in your command.

GROUND/AIR EMERGENCY CODE



Make symbols 8 feet long of wood, stones, snow, parachute strips, or men lying down.

ATTACK ON SKIS

Capt Edward P. Smith, Inf

Thoroughness is the key to a ski operation. Skiing for the Infantryman in a northern operation is just another military skill that must be mastered, for basically, it is merely a means of movement within the battle area. Nevertheless, each time the Infantryman is required to ski in the attack, he must plan each of his actions in the three phases of the operation—the assembly area, from the assembly area to the assault position, and from the assault position to the objective.

The Assembly Area

Having been told by his squad leader that the attack will be on skis, he must prepare his skis with the amount and type of wax preferred to insure maximum freedom of movement in the deep snow. The variety of waxes and capabilities of each give some flexibility in selection.

Next, personal equipment must be arranged. Care must be taken to insure that arms will have freedom of movement when skiing. The rucksack will carry the major portion of supplies: personal clothing, bayonet mounted high on the outside, and ammunition belt (usually placed under the large flap but partly protruding at both ends). Rations, if any, will be carried in the rucksack rather than in the pockets of his clothing. Carrying them or any hard object in the pockets increases the possibility of injury in falling.

Because of the excessive cold, the protective mask becomes very brittle and must be worn near or next to the body. If the Infantryman is wearing a field jacket, this will be unzipped and the mask placed inside, away from the cold and near the body heat.

Sunglare will require use of issue or improvised sunglasses.

The position of the rifle depends on the degree of preparedness necessary. With security forces in front, the rifle can be slung over the rucksack, muzzle up and to the left. The butt should not interfere with the movement of the right ski pole. As the situation changes and attack becomes possible, the rifle can be slung around the neck in front of the body.

From Assembly Area to Assault Position

In this zone of the battlefield, the Infantryman must prepare himself mentally for two problems, concealment (and stealth), and overheating.

As the operation begins, leaders start executing the scheme of maneuver. Formations are assumed. It is vital both to success of the unit and to survival of the individual that maximum advantage be taken of the background and terrain through which they are passing. In the open, where white is predominant, the Infantryman will don his overwhites and will break up the outline of his rifle with strips of white adhesive tape. In forest areas where snow has fallen or has been blown off the trees, the soldier will remove the top portion of his overwhites to blend with the green tree background.

The defender, realizing that the attacker's strength lies in his near-invisibility and his furtiveness, may take many steps to deny the attacker these advantages. For example, areas may be covered by

coal dust to deny blending with overwhites and to change the quality of the snow. Trees may be cut and obstacles created to hinder stealth.

In addition to camouflage and stealth, speed is necessary to produce surprise at the objective. The Infantryman prepares himself for only a short halt at the line of departure. From there, and consistent with the terrain, his leaders direct the unit forward at a rate of 5-8 kilometers per hour. The march must be organized to preserve strength for the final assault. In this movement to the assault position, overheating may become a serious problem. Without proper concern and corrective action, the soldier may become a casualty before reaching battle.

While skiing, the body generates a large amount of heat, and clothing prevents that heat from escaping. All clothing not needed for warmth during the march should be removed. Remembering that to stay warm he must not get too hot, the skier may loosen his uniform (by unzipping or unbuttoning) to allow cool air to circulate and warm air to escape. When the situation requires him to stop, the body generates less heat, and he must readjust his clothing to keep in the warmth.

From Assault Position to Objective

Upon his arrival at the assault position, the Infantryman faces many problems. Among those he must plan to meet are obstacles, disposition of his skis, appropriate firing positions, close combat, and the cold.

As mentioned earlier, the defender may have prepared obstacles, especially along the trace of the final protective fires of his automatic weapons. Explosives, wire cutters, and other equipment will be used in breaching these.

Once at the assault position on skis, leaders must re-evaluate the snow condition and depth, and must determine whether to continue on skis or dismount. Present US Army bindings are not of the type that permit mounting and dismounting skis rapidly. If troops dismount, skis are faced about, left in groups, and retrieved later.

Supporting fires for the assault will be VT, because the cushioning effect of the snow limits the effect of point-detonating rounds. So as the artillery lifts, the Infantryman must push the attack with exceptional vigor. If the attack is slowed, or fails in snowy terrain before the seizure of the objective, unusually heavy casualities will result.

Once the fire fight begins on skis, the soldier must force for a winning decision. He knows that, if at all possible, the enemy must be defeated by small arms. Hand-to-hand combat, bayonet encounters, and at times even grenade throwing are not easy when mounted on skis or on foot in deep snow.

The success of the engagement may be affected in its final stages as easily by the cold as by swift movement and deception. Rate of fire, and firing accuracy, vary considerably from what is normal. Weapons cannot be touched by bare hands, but at the same time the cumbersome gloves restrict use of fingers. And as the objective is overrun and consolidation and reorganization begins, physical effort is reduced. Soldiers must don clothing from rucksacks to keep warm, for the amount of body heat being generated will decrease also. The expenditure of energy may compel him to eat now. Yet, as in other attacks, there are tasks to be done.

The Infantryman in northern operations faces many problems. He who is trained in planning a thorough solution to these problems will be counted among those present following the successful seizure of the snowy objective.

(The problems of assaulting over snow are immense, and little firm doctrine is possible because of the varieties of conditions that exist. An assault on skis, head-on into a dug-in position, is well nigh impossible; yet it may be the only solution at a specific time and place. On the other hand, movement on snow which is more than ankle deep critically limits the speed and sorely taxes the endurance of the rifleman. Flank attacks, often voiced as the "ideal" solution, are almost a requirement in deep snow. This, however, also leads one to realize that the defender will so organize to avoid having a flank which can be assaulted with impunity. Experience seems to point out that the most opportune time to strike an enemy is when he is on the move, for it is then that he will have flanks, and it is then when surprise, always difficult to achieve, will be most likely to succeed.—Ed.)

Continued from page 45

the platoon encounters in transporting the kitchen. This can be overcome through the use of sleds, however. Thus, the "platoon kitchen" is, in most situations, the best method of field feeding in subzero weather. As such, it will play a major role in the success of our operations in the arctic.

Since the author prepared this article, we have learned that the cooking outfit he recommends has been evaluated in light of tests. Because of certain aspects which apparently were fire hazards, this kit has been scrapped. However, the thesis of platoon "kitchens" is still, we gather, a highly acceptable manner of accomplishing an important and difficult function in cold weather operations.—Editor

NUCLEAR ACCOUNTANT

Capt Desmond D. Dewey, Inf

Nuclear radiation can kill people just as dead as a machine-gun bullet can. But radiation is an invisible killer, with few, if any, immediately visible symptoms. A man with a large dose of nuclear radiation might live for days, only to die without ever realizing the cause. The seriousness of the casualty depends, of course, on the amount of radiation absorbed, as measured in units called rads*. A dose of 700 rads would make survival impossible, whereas a dose of 100 rads might incapacitate a man for only a short time, if he receives proper treatment. But in order for proper treatment to occur, the radiation dosage which the patient has received must be known to the persons rendering medical assistance. A commander must also know how much radiation has been received by his men in order to plan for future employment of his unit. At the battle group level, this information is seen in the general terms of which companies and other units are completely effective, partially effective, or totally ineffective, based upon the average dose the unit received. A heavily dosed unit should be replaced, whenever possible, by a fresh unit if there is any likelihood of additional exposure.

But at the company and platoon level, determination of the unit's effectiveness involves knowing the dosage of radiation received by each individual within the unit. This must be known so that the unit's level of combat effectiveness can be determined and reported to higher headquarters. Thus, there is a definite need, tactically and medically, for recording dosages of nuclear radiation. Let us therefore examine a typical unit SOP for reporting and recording radiation exposure of personnel. The

*An arbitrary term used as a measure of roentgens, or roentgen equivalent, absorbed by the body. Note that this is very difficult to determine from a dosimeter, since the reading on a dosimeter is the radiation which struck *it*, and not necessarily what the whole body received.

first item of business for such an SOP is to designate a "nuclear accountant," that is, some person to keep a record of the total radiation dosage received by members of a unit. This should be some person who is normally found in a central location during a combat situation. In a company it could be the Company Clerk. A clerk's primary concern is preparing records and reports. For these jobs he has adequate supervision from the First Sergeant, guides for completing correspondence and DA Forms, and usually a typewriter.

For his additional duties as Nuclear Accountant, the Company Clerk needs no additional supervision, DA Forms, or special equipment. His only tools would be a Company roster and a pencil.

From whom does the unit Nuclear Accountant get his nuclear data? What does he do with this data? The answer to these questions should also be made a matter of SOP.

The reporting and recording portion of a unit SOP might follow along these lines: After a nuclear explosion, platoon leaders or platoon sergeants report the total dose received by members of their platoons to the company. In a defensive situation, this report would normally be given when the peak dose rate has been reached. When under attack or when crossing through a contaminated area, the unit would report direct readings of the highest dose received. These readings are obtained using the Army's standard "dosimeter" (Figure 1). These simple one or two-sentence reports from the rifle platoons are transformed into the company commander's nuclear data.

What about our principal character in this chain of nuclear reporting—the company clerk, alias Nuclear Accountant? He needs no special training merely to record the dose received next to an individual's name. He knows to which platoon each man is assigned. Having received the platoon messages, the clerk records beside each name the total dose, the date, and time received. A sample entry might read: "Burns, Robert A. RA 1243-8246. (50 rads, 110800 Mar).

Once the unit Nuclear Accountant has recorded this data, the company commander not only has the information he needs for his "Flash" message to Battle Group, but he also has the average dose received by each member of his unit who was subject to the radiation. With few exceptions, these reports resemble other normal reports (such as casualty and ammunition reports) sent by platoons after taking an objective. Thus, if they have been properly trained, small unit leaders will report radiation effects in much the same way as other routine matters.

The real value of this nuclear data will vary. In an all-out nuclear battle, it may have little meaning. But in the now-popular concept of tactical nuclear warfare, where both sides avoid total nuclear annihilation and confine nuclear attacks to the battlefield, the amount of radiation from low-yield warheads will have meaning.

The work of the unit Nuclear Accountant will have special importance when a soldier is evacuated through medical channels, or when a unit is replaced in combat after fighting under nuclear conditions. Battle wounds that endanger the soldier's life are usually treated on the battlefield. The type of treatment needed is easily administered by well trained medical personnel when they can see the wound. But what about a "wound" they can't see, nuclear radiation? They cannot properly treat men who have been exposed to this invisible killer unless they know how much radiation he has received and when.

The nuclear "account" can save this man's life. When the man has been evacuated to the aid station, the clerk can look at his special roster to see whether the man was ever exposed to radiation, then notify the Battle Group Surgeon. This nuclear data is also the basis for an entry in a man's medical record, being entered when he is evacuated or after the combat action is over.

On the nuclear battleground, it is not until the unit Nuclear Accountant has recorded the amount of radiation received that the company commander can truly judge his unit's combat potential and at the same time protect the lives of his men. It is important, therefore, that every unit have an SOP for recording nuclear radiation, and a capable "Nuclear Accountant" to carry it out.[1]

1. For a consideration of this topic as related to higher level units, see "Radiation Exposure and the Tactical Mission" by H. Paul Whitten in *Army*, July 1961.

THE "RIGHT OF THE LINE"

The "right of the line" is the place of honor in most ceremonies. The senior walks, sits, or rides on the right of his junior. The national flag is carried and displayed on the right of all other flags and colors. The origin of this custom goes back to the days when men fought with swords. The stronger swordsmen were placed on the right where there was more freedom of movement for the sword area. The right then came to be regarded as a place of honor.

There is one interesting exception to this, however. Although the position at the "right of the line" at parades used to go to the most battle-honored unit, it seems that too many units, jealously aware of their past glories, felt that they deserved to be on the right. So today we normally follow the non-controversial procedure of assigning the "right of the line" at parades to the slowest moving unit or to the lowest lettered unit alphabetically. (Captain R. E. Price)

MAINTENANCE in the Far North

With the northern regions becoming more important in world affairs, it is necessary for the American military man to learn all he can concerning operations in these areas. One of the problems with which he will be faced is the problem of maintenance under conditions of extreme cold, deep snow, lack of heated shelters, and poor road nets. All of these cause problems not encountered in more temperate climates.

The temperature ranges that may be expected are divided into three groups, with each group having a different effect on vehicular maintenance. In regions where the temperature does not go below −10°F, maintenance is no more difficult than it is in the northern part of the US during the hardest winters. When the temperature ranges between −10° and −40°F, a lack of winter gear for vehicles will cause from slight to total loss of operating efficiency. When the temperature goes below −40°F, the maximum efforts of well trained men are required to perform even simple tasks with complete winter material.

In the coldest temperature it may take five times as long to perform maintenance on vehicles as in a temperate zone, since equipment must be allowed to thaw out and warm up to operating temperatures before a mechanic can make satisfactory repairs. Some type of pressure-sensitive, light gloves must be used by mechanics to keep their hands from sticking to the bare metal. When possible, the work may be done in heated shelters, either issued or improvised.

Increased stocks of repair parts, particularly those depending upon lubrication for long life, will be required. Extreme cold weather reduces the efficiency of lubricants, puts a heavy drain on batteries, results in broken metal parts, and restricts the amount of maintenance that can be done in the open. However, when heated shelters are provided for maintenance personnel, care must be taken to prevent moisture condensation from forming on optical instruments, weapons, vehicles, and signal equipment. Equipment brought from outside into a shelter will rapidly cause condensation. Malfunctions frequently occur when this equipment is returned to the outside and the water freezes. A balance must be established whereby all adjustments possible are made out-of-doors with the mechanic provided only a windbreak.

Standard weapons, vehicles and other equipment will operate satisfactorily in the far North during all seasons, providing they are winter modified and equipped with winter kits as directed by appropriate technical manuals. Preventive maintenance becomes more important than ever.

Some of the special products which permit equipment to function efficiently include OES (an engine oil that remains fluid at −50°F and affords lubrication from 0° to −65°F), GOS (a gear lubricant especially designed for subzero use), arctic hydraulic brake fluid, shock absorber fluid, and antifreeze. Their use is prescribed in the appropriate FMs and TMs.

Equipment provided to insure satisfactory starting, operation, and

overnight storage in extreme cold includes personnel heater kits, power plant heater kits, cold starting aid kits (slave kits), and closure kits.

One problem area is that of brittleness of metals. A slight blow from a hammer may cause a pin to shear or a hook to break. Rubber and canvas become stiff and inflexible, flat spots develop in tires if left standing for too long a time; tarps cannot be folded without damage; leather will crack unless it is treated with neat's foot oil. Realization of this, plus proper application of heat, will reduce malfunctions due to brittleness.

Water, when it freezes and expands, will crack the engine block of any modern vehicle. Condensation of water in gas tanks and lines will have the same effect. Glass and plastic will crack if exposed to sudden changes of temperature. Gasoline may fail to vaporize properly, paint will crack and peel, oil and grease will congeal—all these must be appreciated and anticipated if the vehicles are to be used successfully. FM 31-70, *Basic Cold Weather Manual,* gives a very good check list for keeping the unit's vehicles in the best possible mechanical condition. Study of this appendix to the manual will assist the small unit commander in understanding the problems facing him, and will give him a means whereby some of these problems may be reduced.

The problems of maintenance are best seen by taking a brief look at each of the vehicle's five major systems: cooling, electrical, fuel, lubricating, and power train.

THE COOLING SYSTEM—A vehicle cooling system should be protected by antifreeze to at least 10° below the lowest expected temperature. The most common failures of the cooling system result from frozen radiators and leaks. Vehicles with frozen radiators must be placed in heated shelters (or covered and heated) until the coolant thaws. Under no conditions should the vehicle be started until the frozen radiator has been thawed. The inside of a radiator hose will usually deteriorate more rapidly than the outside. Pinching the hose will reveal weak spots which are likely to rupture.

Other potential leakage areas are around the water pump gland and the cylinder head gasket. The latter cannot be detected from outside the engine. Unless it is detected, usually by noting dilution of the engine oil, it will seriously damage the engine.

Low operating temperatures, caused by extremely cold air in the engine compartment or by a faulty thermostat, will cause excessive fuel consumption, dilution of the engine oil with unburned fuel, and sludge from condensation. Proper installation of the appropriate arctic kits will prevent many of these problems.

THE ELECTRICAL SYSTEM—Chargeless or frozen storage batteries are the most frequent electrical system problems. The battery and engine should be preheated before the engine is started. Batteries should always be kept fully charged to prevent their freezing and to insure sufficient current for starting. A battery warmed at a rate faster than 1°F per minute may explode. Use of battery heating pads, provided in arctic kits, will eliminate most battery failures.

Operating the starter too long without allowing it to cool may burn it or break its motor. Congealed grease and accumulated ice must be cleaned off the starter frequently to allow it to engage and disengage freely. Loose electrical connections and broken insulation are common in northern areas. Wiring should be checked daily to detect these quickly.

THE FUEL SYSTEM—Ice in the fuel system will naturally prevent gasoline from flowing. Fuel lines may be thawed by heating the low places in the lines, or by parking the vehicle in a heated shelter. By keeping the tanks full, and using ½ pint of denatured alcohol with each 10 gallons of gasoline, water condensation (and freezing) may be kept to a minimum.

THE LUBRICATING SYSTEM—Low oil pressure and the accumulation of sludge cause most failures in the lubrication system. Engine oil consumption will be high when using the subzero grade oil (OES). The oil level must be checked more frequently than usual. The correct operating temperature ranges from 160° to 180°F. Engine idling should *not* be permitted.

THE POWER TRAIN SYSTEM—Clutch and transmission failures are caused by the added drag on the power train of congealed lubrication, and by failure to follow proper warm-up procedures. Broken axles are caused by frozen wheel bearings and by tires frozen to the ground. Placing a piece of brush, lumber, or tar paper under the tires when the vehicle is parked will prevent freezing of its tires to the ground.

A vehicle should be moved very slowly for at least 100 yards after being parked for several hours. The rubber parts of the brake system are prone to give way under the cold. Brake shoes freeze from the ice and mud picked up while driving. Air brakes will fail if water is allowed to remain in the air tanks. Shock absorbers, unless filled with the proper fluid, will give way rapidly. Frequent inspections and repair of hangers, U-bolts, shackles, and spring leaves are necessary to prevent broken springs. Moisture in valve cores will freeze and allow air to leak from the tires.

* * *

TM 9-207 (September 1959) is the most recent publication on operation and maintenance of ordnance materiel in extreme cold. The best general guide for vehicular maintenance, it is indispensible to a maintenance unit in the far north.

ANNUAL INDEX

This feature is designed to increase the usefulness of INFANTRY as an instructional aid and reference source. The index lists by category all articles that have been published in INFANTRY in 1961. The last index appeared in the January issue of this year, and listed articles from April 1959 through November 1960.

Abbreviations for the issues contain only the first letters of the months (as an example, MA denotes March-April). Articles credited to "Staff" were written by members of the staff of the magazine, of USAIS, or of various public information offices. The designation "(T)" indicates "Tricks of the Trade."

AIR SUPPORT
An Air-Armed Battle Group, Capt W M Jenkins Jr, JF.
Current Army Aircraft, Staff, MJ.
Small Unit Air Loading SOP, Capt T E Aaron, MA.

ARTILLERY
Artillery Supporting Fires, Capt C B Lee, JA.

ARMOR
Assignment: Armored Division, Capt M E Meister, SO.
Blind, Halt, Destroy! Capt D G McRae, JA.
David versus Goliath, Capt J W Burkheimer, MJ.
Antitank Drone, Capt H J Stein, ND.
What's Your TEQ? Lt Col A E Seifert, MJ.

CBR WARFARE
Chemical Support for the Battle Group, Capt W R Perry, MA.
Fallout Prediction Drone, Maj J J Ondishko, ND.
Nuclear Accountant, Capt D D Dewey, ND.
Nuclear Target Analysis, Capt L C Menetrey, SO.

COMMAND PROBLEMS & STAFF PROCEDURES
Antenna Squad, Capt R E Marshall, SO.
Cold Weather Injuries, Lt Col G T Britton, ND.
More on Military Justice, Capt W P Tyson Jr, JF.
Operation Order . . . Test, Staff, MA.
Reflections on Command, Col J J Wagstaff, JF.
Staff Decision at Gettysburg, Maj J K Shaffer Jr, MJ.

COMMUNICATION
Anti-Jamming, Lt G D Livingston, SO.
Get the Most from Your AN/PRC-10, Lt W A Hamilton, JA.
Listen and You Shall Hear, Capt D J Green, SO.
Packaged Radios (T), Sgt J R Hardison, ND.
Remote Control for Better Communications, Lt Col L F McSherry, MA.
The Captain Can't Communicate, Capt B A Lowery, MJ.

ENGINEERS
Engineers as Infantry, Capt J H Phillips, SO.
Explosive Charge Control Panels, Maj F H Armstrong, MA.
Explosive Firing Systems, Maj F H Armstrong, JA.
Fighting Fortifications, Capt F E Garman, JF.
Ice Mining—Army Style, Capt F C DeLisle, ND.
The Ear Muff, Capt L R Trapp, JF.

FOREIGN ARMIES
Current Soviet Small Arms, J E Smith, MA.
Soviet Army Mortars, J D McGuire, MJ.
Soviet Offensive Tactics, Maj W A Brown, MA.
Soviet Winter Operations, Staff, ND.
The Cremona Division, Staff, JF.
The Czechoslovak Army, Capt O P Chaney Jr, JA.
The Greek Army, Staff, SO.
The Swedish Infantry, Gunnar Ruud, ND.

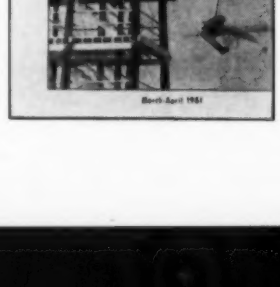
GEOGRAPHY
Laos, Staff, MJ.
Thailand—Land of Free People, Capt D E Jenne, MA.
The Far North, Staff, ND.

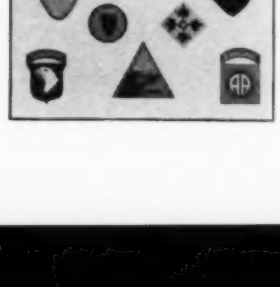
GROUND MOBILITY
Bring Back The Mule, Capt J R Woodall, JA.
Mobility in Northern Latitudes, Capt H E Vincent, ND.
The Infantry Vehicle, Maj W P Meyer, JF.
The M19 Periscope, SFC M L Sparks, JA.
Today's Knight, Lt Col A F Ahrenholz, JF.

HISTORY
A Lesson in Nuclear Effects, Capt J F Bell, JA.
Guerrillas in Malaya, Capt G C Phipps, MJ.
Staff Decision at Gettysburg, Maj J K Shaffer Jr, MJ.
The Decision is Yours, Captains L C Menetrey & W A Holt, JF & MA.
"The 100 Pipers," Capt M G Swank as told to Lt E L Smith, MJ.
Welcome to Plattsburg, Maj R L Hillman Jr, MJ.

INFANTRY AROUND THE WORLD
1st Infantry Brigade, SO.
2nd Infantry Brigade, SO.
1st BG, 20th Infantry, USARCARIB, JF.
1st BG, 23d Infantry, USARAL, MJ.
1st BG, 27th Infantry, USARPAC, JA.
1st ARB, 54th Infantry, USAREUR, MA.

INFANTRY TACTICS
A New Look at Defensive Tactics, Maj W A Brown, JA.
Attack on Skis, Capt E P Smith, ND.
Blind, Halt, Destroy! (See Armor)
Counterattack, Maj W A Brown, JF.
David versus Goliath (See Armor)
Defense of a River Line—ROAD, Maj W A Brown, ND.
Encirclement, Capt W R Colvin, SO.
Engineers as Infantry, Capt J H Phillips, SO.
Fighting Fortifications, Capt F E Garman, JF.
Passage of Lines, Staff, SO.
Raid and Destroy, Capt J G Pappageorge, JA.
Raid, Space Age Style, Capt R J Folta, SO.
Rifle Platoon in the Attack, Staff, MA.
Rifle Platoon in the Defense, Staff, MJ.
River Navigation, Lt J L Hutchison, JA.
Subarctic Bivouac, Capt R E Wharrie, ND.
Today's Knight (See Ground Mobility)
The Assault, Staff, MJ.
Clandestine Assembly, Capt W J Prokup, ND.
The Old One-Two, Capt J R Galvin and Lt H C Lyon, MJ.





What's Your TEQ? (See Armor)
Withdrawal Operations, Maj W A Brown, SO.

LEADERSHIP
Rifle Squad Leader: Toughest Job in the Army, S/Sgt F H Best, ND.
Leaders Reaction Course, Capt J J Morrissey, ND.
More Time for Sergeants, Capt F A Darden, JF.
The Decision is Yours (See History)
Troop Leading Steps Work, Lt J L Sellentin, JA.

LOGISTICS
A Matter of Understanding, Lt G J Schneider, JF.
A Neglected Art, Capt R L Wheaton, SO.
Feeding in Subzero Weather, Capt A J Smith, ND.
Maintenance in the Far North, Staff, ND.
Unit Supply System, Staff, ND.

MISCELLANEOUS
A New Face for a Foxhole, Lt S L Canby, MA.
A Portable Barrier, Capt Wade Hampton, JF.
Feathers Aren't Birds, Capt F J Simmons, JA.
Field Expedient Public Address System (T), Lt F L Mills, MJ.
Field Expedient Transparencies, A C Ramsay, JA.
Mobile CP (T), Col T C Mataxis, SO.
Survival Test, Lt M C Korologos, JF.
The Days of King Zog, Lt Col A E Seifert, JA.
The Infantry Board, Capt J M Krisewicz, ND.
The Toughest Kid on the Block, Lt W J Trunkes, JF.
Waterproof Map (T), SFC W H Bruce, MA.
Windchill Chart, Staff, ND.

NAVAL SUPPORT
Naval Gunfire Support, Capt P L Massa, JF.

ORGANIZATION
An Air-Armed Battle Group (See Air Support)
Antenna Squad, Capt R E Marshall, SO.
Bah Bah Black Sheep, Capt M Kelman, JA.
Battle Group Operations Center, Staff, SO.
Battle Group R&S Forces, Capt G A Millener Jr, MA.
Chemical Support for the Battle Group (See CBR Warfare)
Mechanized Infantry, Col G H Huppert, SO.
Minor Changes—Major Results, Col S T McDowell, MJ.
Mobile Task Forces, Staff, SO.
OVUREP, Col J H Hayes, MJ.
Reflections on Command, Col J J Wagstaff, JF.
Reorganization of the Infantry—I, Staff, JA.
Reorganization of the Infantry—II, Staff, SO.
Reorganization of the Infantry—III, Staff, ND.
Squad Simplified, Lt C M Barone, MA.
Strengthen the Link, Capt J H Pate, SO.
The Captain Can't Communicate (See Communication)
The 1966 Squad, Col G H Huppert, JF.
Radar for the ROAD Battalion, Maj W A Brown, ND.

PERSONAL AFFAIRS
Going to Korea? Capt D L Fry Jr, MA.
30¢ a Pound, Capt W T Prescott, ND.
Your Personal Affairs, Capt R D Wilson, SO.

ROLE OF THE INFANTRY
Alert Force, Capt R V N Perkins, SO.
An Infantryman, Lt Col S B Berry Jr, JA.
For Those Who Dare, Lt Gen R E Jenkins (Ret), SO.
Mad Challenge, Maj M Ikram Khan, JF.
Meet An ROTC Unit, Capt R J Young, JA.
SCRAGMAG, Maj D N Gower, ND.
Why I Chose the Infantry, Lt Col C F Austin, MA.

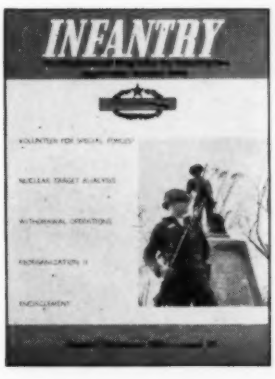
TRAINING—Individual
Assignment: Armored Division (See Armor)
Box Yourself In, Lt R J Kattar, MA.
Breaking the Sound Barrier, Capt L McCall Jr, MA.
Cold Weather Injuries, Lt Col G T Britton, ND.
Leaders Reaction Course, Capt J J Morrissey, ND.
Let's Standardize Trainfire, Capt H C Fisher Sr, SO.
Make Interest Pay Dividends, Capt D T Williams, JA.
"Medic!" Lt B A Keppel, JF.
Meet an ROTC Unit, Capt R J Young, JA.
More Time for Sergeants, Capt F A Darden, JF.
Mortar Sight Training Device (T), SFC I G Kohr, JF.
M92D Training Aid, SFC I G Kohr, ND.
Officer Candidate Training, Staff, JA.
Quality not Quantity, Lt R H Ratcliff, JF.
Ranger Training, Staff, MJ.
Stumbling Block to Realistic Training, Lt Col L Crawford and Lt E R McGreevy, JF.
Survival Kit, M/Sgt T H McCaskey, ND.
Arctic Navigation, Capt R J Kattar, ND.
The Orientation Course, Lt R J McCloy, MJ.
The Training of an Airborne Soldier, Staff, MA.

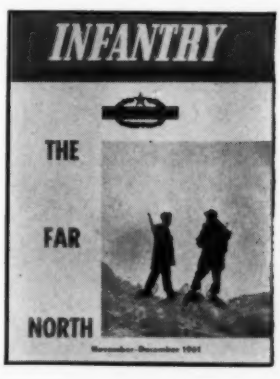
TRAINING—Unit
An Inspection Checklist, Capt J A Milani, SO.
ICTP—13: A Pattern for USAR Training, Capt R A Sullivan, MJ.
OVUREP, Col J H Hayes, MJ.
Paik-Ho, Maj Gen F T Pachler, JA.
Proven—The Opposing Forces Test, Maj W R Ellis, JA.
Effects of Northern Regions on Military Operations, Staff, ND.
The USARCARIB School, Staff, JA.
USAR Training, Lt K M Pearson Jr, JF.
Volunteer for Special Forces? Capt D R Pinney, SO.

UNCONVENTIONAL WARFARE
Guerrillas in Malaya, Capt G C Phipps, MJ.
Guerrilla Warfare, Lt Col Marc Geneste, JF.
Volunteer for Special Forces? Capt D R Pinney, SO.

WEAPONS
Current Soviet Small Arms, J E Smith, MA.
M60 Immediate Action, Staff, JF.
Redeye, Capt D G Bearss, SO.
Soviet Army Mortars, J D McGuire, MJ.
The M79 Closes the Gap, Capt R Byrom and Lt N L Carlton, JA.

WEAPONS EMPLOYMENT
Ambush by Claymore, Lt R L Drudik, JF.
Artillery Supporting Fires, Capt C B Lee, JA.
Bah Bah Black Sheep, Capt M Kelman, JA.
Explosive Charge Control Panels, Maj F H Armstrong, MA.
Explosive Firing Systems, Maj F H Armstrong, JA.
Fallout Prediction Drone, Maj J J Ondishko, ND.
Heavy Mortars in Northern Operations, Capt C W Strang, ND.
Ice Mining—Army Style, Capt F C DeLisle, ND.
Illumination Missions for the 4.2-inch Mortar, Capt W C Torbett, ND.
Minor Changes—Major Results, Col S T McDowell, MJ.
Naval Gunfire Support, Capt P L Massa, JF.
Antitank Drone, Capt H J Stein, ND.
The Ear Muff, Capt L R Trapp, JF.
The Long Range Rifle, "Sgt Buckhorn," MA.
The Old One-Two, (See Tactics).





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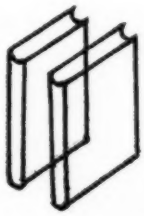

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Handbook, Infantry Reference Data. August 1961. $1.25.

Handbook, Combat Operations. July 1961. $1.00.

Advance Sheet, Rifle Platoon. Offensive Tactics. June 1961. $1.00.

Operations and Training Handbook. Provide student with reference material on command and staff action, SOP's for battle group and division, operational orders and organization. $1.75.

Staff Writing Handbook. Covers principles of clear, logical, effective thinking and writing. Contains information on how to apply these principles to the type of writing required in preparation of staff papers. August 1961. $.60.

Army Aviation Handbook. Covers aspects of Army aviation organization, equipment characteristics, and techniques of employment that are not otherwise readily available to students. June 1961. $.65.

Reference Book, Rifle Company, Infantry and Airborne Battle Groups, USAIS. RB 7-10. Provides guidance to tactical employment of the rifle company of the Infantry and Airborne Division Battle Group, as well as rifle company of nondivisional battle groups. Applicable to nuclear and non-nuclear warfare. $.70.

TRAINING FILMS

The following new films have been approved for release to requesting units:

AIF 6, Code of Conduct—Article II—Never Surrender, 10 minutes.

TF 3-3034, Employment of Toxic Chemical Agents—Part II—Defense, 17 minutes.

TF 5-3002, Construction of Wire Entanglement . 28 minutes.

TF 5-3043, Land Mine Warfare—Part XII—Mechanical Mine Planting Equipment, Dan Patch, 15 minutes.

TF 6-3096, Countermortar Radar AN/MPQ-4A—Part I—Operation, 22 minutes.

TF 6-3122, Extension of Direction by Simultaneous Observation, 23 minutes.

TF 6-3123, The Lacrosse Battalion Firing Section—Crew Duties in Preparation for Action, Firing, and March Order, 30 minutes.

TF 6-3134, The Lacrosse Battalion—Reconnaissance, Selection and Occupation of Position, 25 minutes.

TF 7-3130, 81mm Mortar M-29—Part I—Mechanical Training, 15 minutes.

TF 9-3045, Destruction of Ammunition by Detonation, 31 minutes.

TF 9-3080, Gun, Self-Propelled, Full Track, 90mm, M-56—Part I—Operation and Organizational Checks of the Armament and Fire Control Materiel, 26 minutes.

TF 10-3119, Cooking Outfit for Small Detachments, 22 minutes.

TF 11-3089, Automatic Telephone Central Offices—Part I—Strowger Type Switching Systems, 26 minutes.

TF 11-3090, Automatic Telephone Central Offices—Part II—XY Switching Systems, 30 minutes.

TF 16-3104, Common Sense, 9 minutes.

TF 16-3112, Our Moral Defenses, 10 minutes.

TF 16-3113, Self Control, 6 minutes.

TF 17-3088, Assault Bridging in Offensive Operations, 19 minutes.

TF 30-2993, Strategic Intelligence School Area Film Studies—No. 3—Communist Ruled Countries of East Central Europe, 29 minutes.

TF 30-3030, Military Intelligence Specialist, 22 minutes.

TF 44-3061, Hawk Battery (Mobile) Reconnaissance, Selection and Occupation of Position—Part I—Advance Party, Reconnaissance and Selection of Position (U), 27 minutes.

TF 44-3062, Hawk Battery (Mobile) Reconnaissance, Selection and Occupation of Position—Part II—Movement and Occupation, 22 minutes.

MF 45-9279, I Know Where I'm Going, 22 minutes.

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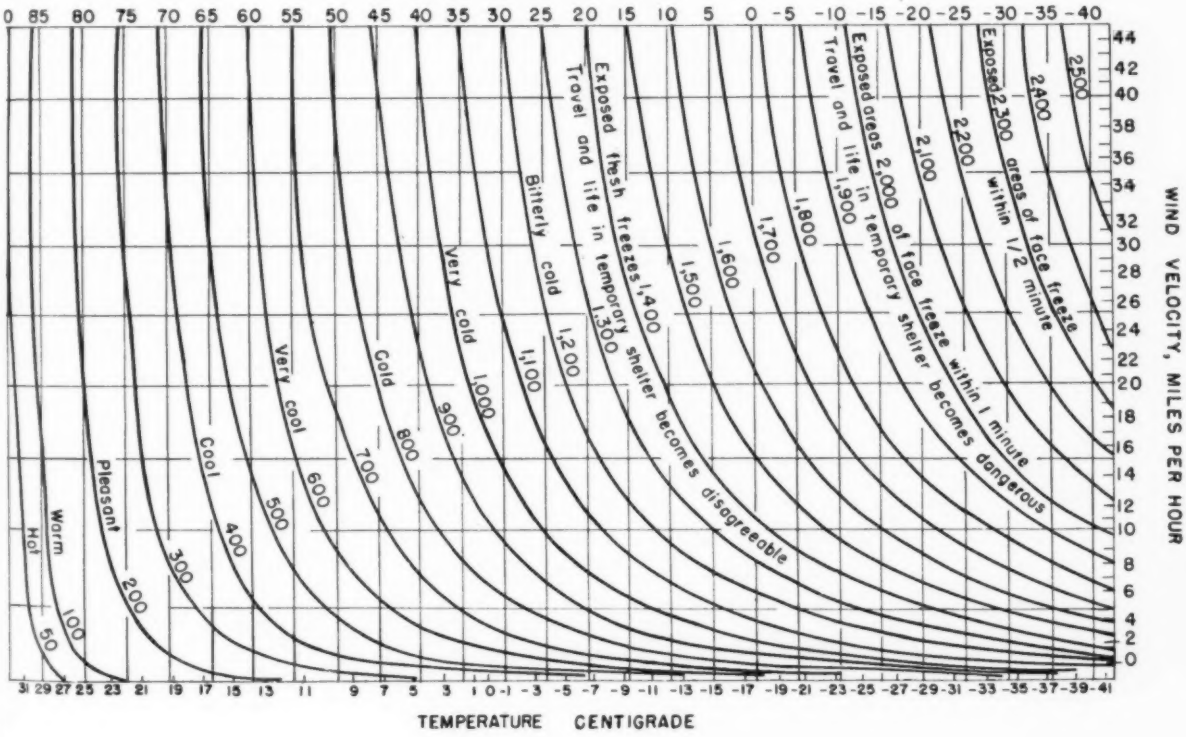
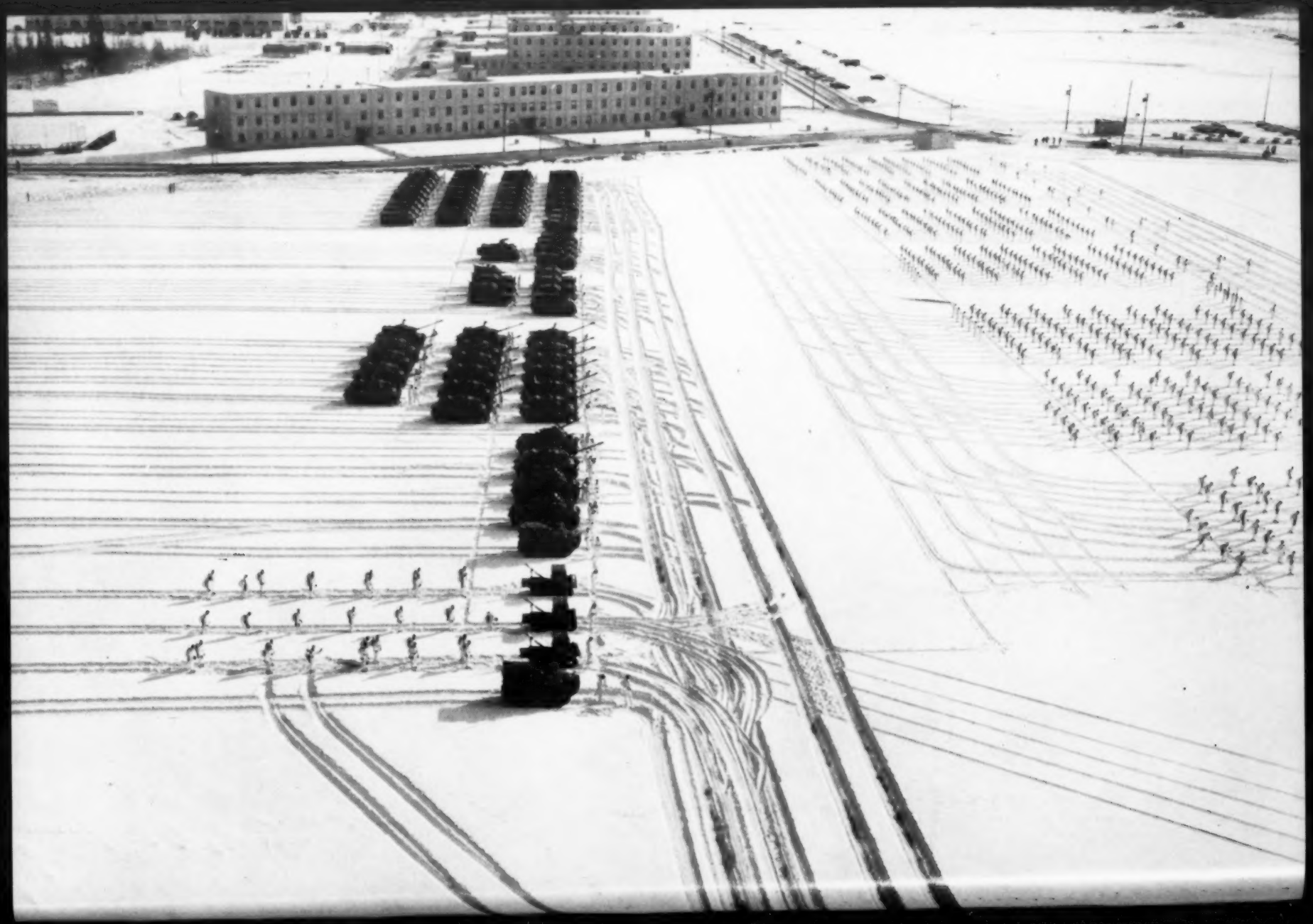
WINDCHILL CHART

COLD weather seems even colder when the wind is blowing. It is difficult to realize how seriously harmful high wind can be. This effect, called windchill, is the combined cooling *effect* of wind and air temperature on heated bodies (or vehicles, machines, etc.). It is the rate of cooling or the rapidity with which body heat is dissipated, a more factual and practical way to express the effect of weather than by temperature alone.

Windchill is expressed in kilogram calories per square meter per hour. The nomogram below shows the windchill factors ranging from 50 to 2500, from hot to extreme cold. It is considered that when the windchill rises to 1300-1400, frostbite is a danger even to trained troops. However, with proper precautions, frostbite can be easily avoided. A windchill factor of 2000 (example: temperature –40°F and wind 11 miles per hour) is dangerous and the exposed areas of the face must be protected. Calm weather in extreme cold might be very pleasant. When there is no wind and the temperature is –30° F, the windchill factor is approximately 1000. As an example of the tremendous effect of wind, a 20 mile-per-hour wind with a temperature of 5°F has more cooling effect (1500) than a 2 mile-per-hour wind with a temperature of –40°F (1400).

Competent authorities on cold weather environment are by no means unanimous in their acceptance of the scientific accuracy of this windchill chart. Since no other more satisfactory or better method has yet been devised, this chart is shown here as a means of highlighting the problem. However, the reader must recognize this chart for what it is—a guide, not an established fact. (From Problem A2011, C&GSC, by permission.)

NOMOGRAM OF DRY—SHADE ATMOSPHERIC COOLING


TEMPERATURE FAHRENHEIT
0 85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 -5 -10 -15 -20 -25 -30 -35 -40
Hot
Warm
Pleasant
Cool
Very cool
Cold
Very cold
Bitterly cold
Exposed flesh freezes 1,400
Travel and life in temporary shelter 1,300 becomes disagreeable
1,100
1,200
1,500
1,600
1,700
1,800
1,900
Exposed areas 2,000 of face freeze within 1 minute
Travel and life in temporary shelter becomes dangerous
2,100
2,200
Exposed 2,300 areas of face freeze within 1/2 minute
2,400
2500
50
100
200
300
400
500
600
700
800
900
1,000
WIND VELOCITY, MILES PER HOUR
44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 8 6 4 2 0
31 29 27 25 23 21 19 17 15 13 11 9 7 5 3 1 0 -1 -3 -5 -7 -9 -11 -13 -15 -17 -19 -21 -23 -25 -27 -29 -31 -33 -35 -37 -39 -41
TEMPERATURE CENTIGRADE